POULTRY HOUSE BLUE PRINTS

1944 EDITION

POULTRY HOUSE BLUE PRINTS

Compiled by

Roland C. Hartman

Editor, Everybodys Poultry Magazine

It has often been said that success in the poultry business depends upon good breeding, good feeding and good management. To these three fundamentals might be added a fourth requirement—good housing.

A drafty brooder house may cause heavy losses of chicks through chilling. An improperly ventilated brooder house might result in carbon monoxide gas poisoning of the chicks. In laying houses, poor ventilation might result in damp litter and eventually lead to respiratory troubles.

This book includes most of the material originally published in "Poultry House Blue Print Plans," a book so popular that five editions were printed in two years, but it has been expanded by including some new plans and some additional basic information on poultry house construction. The discussion of ventilation should be of particular value to those who have a problem of this nature.

In poultry house construction, as in the feeding and management of poultry, there are differences of opinion. These differences will be noticed in the plans presented in this book, but we have tried to present poultry housing information that has been proved sound under practical conditions. Whether you plan to erect new buildings or simply correct defects in your present poultry houses, we hope that this book will be a source of ideas that will increase your poultry profits.

EVERYBODYS POULTRY MAGAZINE

Hanover, Pennsylvania

Contents

Brooder Houses:

10 by 12 Insulated Brooder House .. 24
N. J. 10 by 12 House 26
10 by 16 Brooder House 28
Two in One Brooder House 54
10 by 12 Floorless Brooder House ... 30

Equipment:

Exit Guard 10
Hopper for Male Birds 15
Droppings Pit 18
Double-Swing Partition Doors 24
Handy Catching Panel 37
Feed Storage Bin 44
The Use of Glass Substitutes 45
Portable Fencing 50
Trailer for Moving Shelters 52

Floors:

Six Moisture-Proof Floors 3
Cement-Sawdust Concrete 4
Poultry House Foundations 56

Insulation:

. . . in Poultry Houses 43

Laying Houses:

All-Season Laying Shelter 8
22 by 22 Shed-Roof Laying House .. 12
2,000-Hen Laying House 16
Conn. 24 by 24 Two-Story House ... 19
6 by 8 Backyard Poultry House 31
N. J. 20 by 20 Shed-Roof 32
Penn State 20 by 40 Laying House .. 35
Remodeling Barns Into Laying Houses 40
24 by 24 Summer Hen Shelter 46
Mass. 24 by 24 Two-Story House 48

Range Shelters:

Conn. 6 by 10 Cold Weather Shelter . 23
N. H. 5 by 10 Shed-Roof 27
Ohio 10 by 12 Shelter 51
10 by 10 Range Shelter 55

Roofs:

Care of Roofs 10
Application of Metal Roofing 11
Built-Up Roof Construction 15

Turkey House:

20 by 40 Turkey Shelter 38
8 by 15 Turkey Shelter 53

Ventilation:

Ventilation of Poultry Houses 6
Cooler Houses 37

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Locating Poultry Houses

Exposure, Air and Water Drainage, and Wind Protection Are Among Things to Consider

Since the laying house is built on a permanent foundation and remains on its original location, careful consideration should be given to the selection of the site, especially its location with respect to other buildings on the farm. The house should be convenient to the other buildings, yet far enough away so that the birds will not be disturbed by other operations on the farm.

Exposure. — The poultry house should be built to face the south or southeast in order to permit the greatest amount of sunshine to enter the house. This exposure gives the birds the maximum length of day and the maximum amount of sun during the day, providing more healthful as well as more comfortable conditions. The factor of exposure is not of enough importance, however, to warrant facing the poultry houses to the south, if it makes them at an angle to the other buildings on the farm, and results in an awkward and unattractive appearance of the entire layout.

Drainage.—A location with the land sloping gradually away in every direction is ideal for the individual poultry house, although for the farm as a whole, a gradual southern slope is to be preferred.

When natural drainage carries the surface water away promptly, the danger of damp floors in the house is greatly reduced. Natural drainage away from the house can be secured in level country by hauling gravel or soil to make a small knoll where the laying house is to be built. Never build the laying houses in a low place where drainage collects from the surrounding territory.

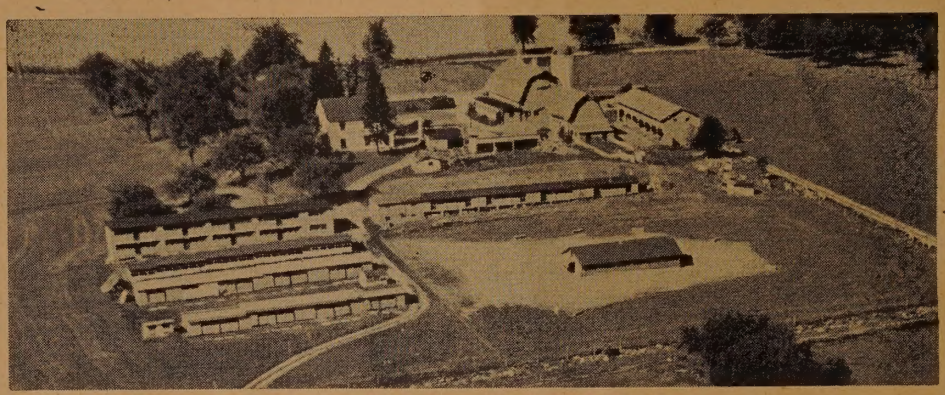
Soil.—A light sandy or gravelly loam soil is to be preferred if the layers are given range. This type of soil dries off quickly following rains, does not accumulate filth on the surface, and yet grows good green crops, thus giving ideal range conditions.

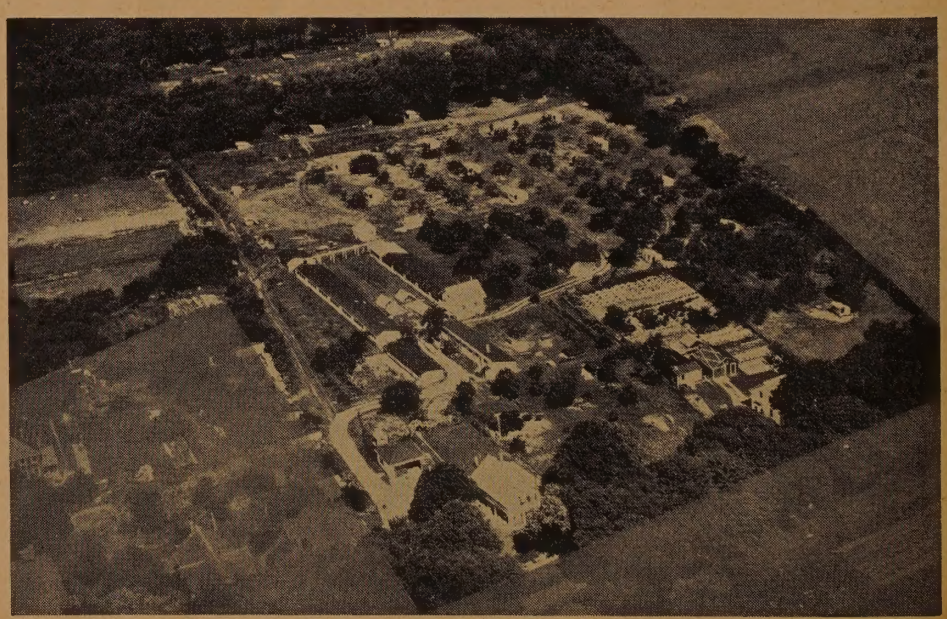
If the layers are to be kept in confinement, the type of soil where the laying house is to be located is of little importance, so long as there is good surface drainage.

Wind Protection.—In selecting the site, always take advantage of any wind breaks that offer protection from prevailing winds. Winds play an important part in the heat loss from poultry houses, and anything that breaks the wind will help to make the house more comfortable during the winter.

Yards—If the birds are to be given range, the house should be located so as to provide yards, both in the front and rear of the house. The yards do not need to be very large, as the birds will seldom consume the green food more than 150 feet from the laying house. When double yards are used, a more constant supply of green food can be grown by rotating the birds from one yard to the other; also, it is much easier to keep the ranges free from filth and contamination.

Future Developments Should be Considered—The site for the location of the house should be chosen very carefully in order to provide for future expansion of the business. One should always have in mind a mental picture of the complete layout. If the plant is likely to be enlarged, allow room for lengthening of the building or for the construction of additional houses in some systematic arrangement.—Ohio Ext. Bul. 94.





Poultry House Floor Construction

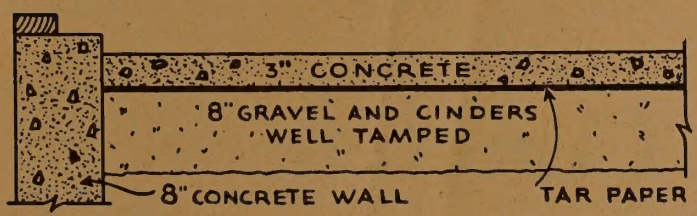
THE six diagrams below reveal the cross section detail of poultry house floors which apparently are successful in various parts of the country.

Because of its permanency and greater ease of cleaning, the floor which is finished with a concrete surface is by far the most satisfactory type of floor. Yet, if a concrete floor is to give satisfaction, certain general principles must be followed.

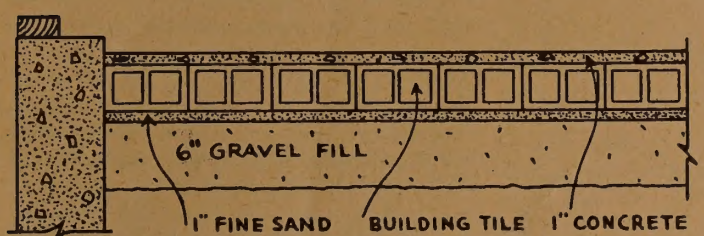
In constructing the foundation walls, they should extend 18 inches into the ground in order to go below the "frost line." Recommendations vary as to the thickness of the foundation walls. Walls that are 5 and 6 inches thick are very common, but for greatest foundation strength, the 8-inch wall is best. Before the walls are placed, provision should be made for any piping which is necessary.

It is not entirely necessary that the fill-in be gravel. Cinders, broken bricks and concrete, field stones that have accumulated, and even some kinds of trash may be used. The main thing to observe is that the fill-in be firm and that it is level before the concrete is poured.

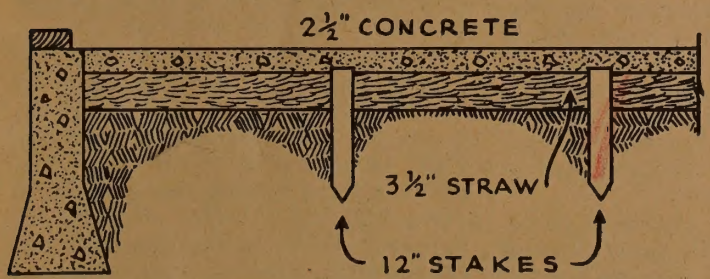
Whenever possible, the concrete floor should be made to slope about 2 inches from back to front of a 20 foot house. There are two reasons why this is desirable. In the first place, it makes flushing of the floor much easier. Then, too, it is helpful to a degree in preventing the litter from piling up in the back part of the pen.



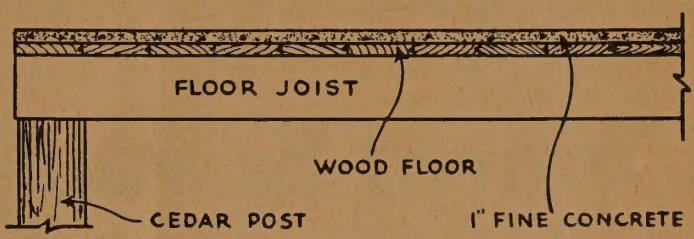
1. This is probably the most satisfactory style of poultry house floor construction. It is very important that the fill-in be well-tamped. The layer of tar paper or roofing paper which is placed on the gravel should have edges of the paper overlapped and sealed with liquid asphalt in order to prevent any rise of moisture from below. Be sure that the floor has a slope of 2 inches in a house that is 20 feet deep. To make it possible to clean each pen separately, the concrete where the sills of the pen partitions will rest should be about an inch or two higher than the rest of the floor. This will prevent water running from one pen to another when the floor is flushed.



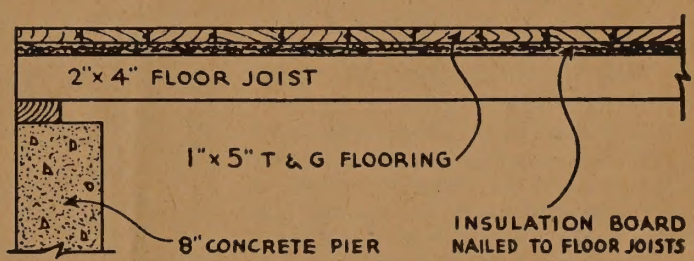
2. Here is another good type of floor which prevents the rise of moisture from below. The use of hollow building tile may increase its cost over the preceding floor, but where building tile can be obtained cheaply, it is worth considering. Here again, the gravel fill-in should be well-tamped.



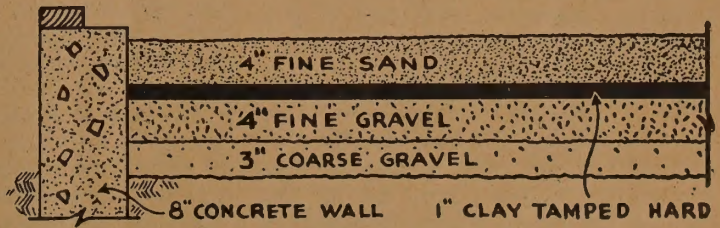
3. This moisture-proof construction for poultry house floors was developed at the Maryland Experiment Station. After the foundation walls are erected, the ground inside is smoothed to a level of 6 inches below the top of the wall. Stakes, 16 inches long, are driven into the ground at 2-foot intervals, allowing 4 inches of the stake to protrude above ground. A layer of straw is then spread over the ground and around the stakes, packing it down solidly. Over this a layer of concrete is poured to a depth of 2½ inches. Rotting of the straw results in a dead air space beneath the concrete slab which is then supported by the stakes.



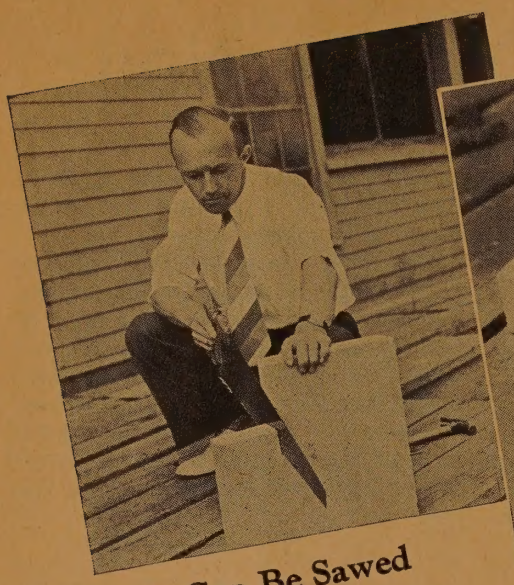
4. This type of construction is especially good in stationary houses with wood floors which have become somewhat worn and are difficult to clean because of the numerous cracks and crevices. It is quite commonly used in Pennsylvania for the second and third stories in barns which have been converted into laying houses. The concrete layer can be anchored to the wood floor by putting nails in the old floor at frequent intervals and allowing the heads to project upward about one-half inch. Sometimes one-inch poultry netting is tacked down on the floor as a means of reinforcing the concrete.



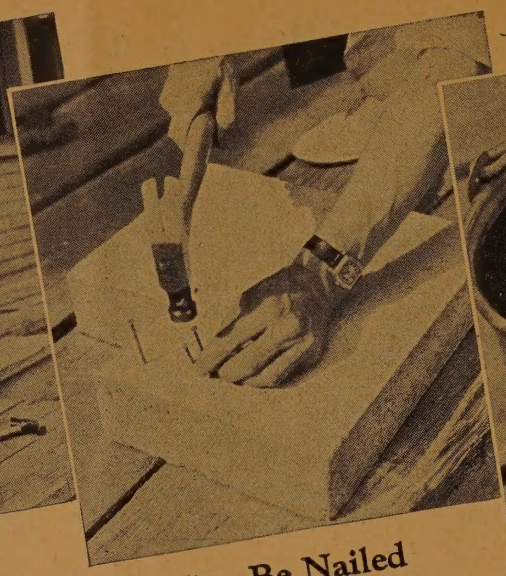
5. Where poultry houses are built on steep slopes, the raised floor which is open beneath may be easier to construct than any of the concrete floors. Wood posts can be used instead of concrete, but the wood should be treated with some wood preserver such as carbolineum. Use 2-inch by 6-inch floor joists if the house is more than 12 feet deep. The layer of insulation board applied to the joists before the regular wood flooring aids in preventing some of the condensation of moisture which occurs on a cold floor under which the winter wind is sweeping.



6. Here is a floor that is suitable in sections where sand is cheap and easy to obtain. It does not, of course, possess the cleaning advantages of a concrete or wood floor, but there is not so much danger of a contaminated floor if a liberal covering of litter is used. Once each year, the top layer of sand should be removed completely and replaced. Concrete foundation walls are recommended in order to assure rat-proof construction.



It Can Be Sawed



It Can Be Nailed

It Floats

Photos from U. of N. Hamp

Cement-Sawdust Concrete

Instructions by Russell R. Skelton
Condensed from University of New Hampshire Extension Circular 217

CEMENT-SAWDUST concrete in appearance, is the same as an ordinary cement-sand mortar, except that it is light and fluffy and weighs about one-third that of ordinary concrete. The compressive strength of the material will vary with the proportion of cement to sawdust, but will average 300 to 400 pounds per square inch.

The material is warm and is an excellent insulating agent. The finished product is water repellent, is easily finished to a smooth surface and is relatively resistant to abrasion. It is fire resistant and will not support combustion; tests proving that it will withstand temperatures up to 250 degrees F. without detrimental effects.

The resilient quality of the material is due to the somewhat porous character of the mixture. Resilience is very desirable for poultry houses, since the floors of such buildings should possess good shock-absorbing properties. It can be sawed with an ordinary carpenter saw and it will hold nails or screws.

Materials Required

The materials recommended for use in obtaining the best results consist of Portland cement, sawdust and water. The cement may be of any commercial brand readily obtained in all localities; however, it should be new, dry and free from lumps.

The sawdust should be of that quality obtained from the main saw, rather coarse in size and not less than one year old. White pine, spruce or hemlock sawdust is preferable. Hardwood sawdust is not recommended since the grains are likely to be too small and too uniform in size. Sawdust obtained from the resaw, or from factories or mills should never be used because the grains are too small.

The sawdust should be screened through an ordinary mason screen, in order to remove the larger pieces of stringy bark. The mesh of the screen should not be less than one-fourth inch.

The water used for mixing should be clean, and preferably from a supply used for drinking or watering purposes.

Equipment Necessary

The equipment required consists of a power-driven concrete mixer, a metal wheelbarrow, buckets, bushel baskets, a wooden float, a steel float and a light wooden tamper.

It is absolutely necessary that the material be mixed in a power-driven mixer, in order to achieve the desired results peculiar to cement-sawdust concrete. Any size or type mixer will suffice; however, a one-fourth bag mixer is recommended as adequate for small jobs.

Buckets of known capacity are required to measure the exact amount of water and cement required for the mixture, and bushel baskets or other measures may be used to measure the sawdust.

A wooden float and a steel float are required to impart the proper finish. The wooden float should be used first to obtain the preliminary surface and a steel float should be used to obtain the final finish.

Some form of a light wooden tamper should be made and used to compact the material previous to the finishing operations. It should not be too heavy and may easily be constructed from materials available on the farm.

Thickness of Floor Slab

For cement-sawdust concrete poultry house floors, a total thickness of 3 inches is recommended. This is obtained by first pouring a base 2 inches thick and then placing a surface 1 inch thick directly on the base before the former has hardened. It is important that the operation be continuous in order to obtain a good bond between the two courses.

Size of Floor Slabs

Concrete floors are usually constructed in relatively small unit areas with contraction or construction joints placed vertically between the slabs. It is recommended for the cement-sawdust concrete floors that slabs no larger than 12 by 12 feet be constructed in one operation.

The floor area may be divided into conveniently sized smaller slabs by lightly nailing 2 by 3 timbers to the floor, the 3-inch dimensions vertical. This arrangement of timbers furnishes a form to hold the concrete in place, and also a means whereby the proper level of the concrete slab can be obtained. A board may be moved along the top of these header boards to accomplish a spreading action.

As soon as one slab is completed, the header timber is removed, leaving a vertical face against which the concrete of the next slab is placed. This vertical face forms a vertical contraction joint; no other joint is necessary since cement-sawdust concrete

does not contract or expand in any appreciable amount.

Proportioning the Mix

In preparing concrete it is necessary that the mix be designed to best suit the requirements of the job. In this case a mix of 1 volume of cement to 3½ volumes of sawdust, loose measure, is recommended as most desirable.

The total volume of material to be mixed at one time will depend upon the capacity of the mixer. A bag of cement is equal to one cubic foot. The most common type of mixer, one with a ¼ bag capacity, will ordinarily produce about 1 to 1½ cubic feet of mixed concrete, using ¼ bag of cement, for the average mixes. It is recommended that after obtaining the mixer, a trial mix be prepared to furnish a basis for determining the volumes to mix per batch for the entire job. In order to obtain good conditions the mixer should be run about one-half full. A trial mix for a ¼ bag mixer is 2 gallons of cement to 7 gallons of sawdust, which is a mix of 1 to 3½. Adjustments can be made after the first trial, but the ratio 1 to 3½ must be maintained. Any convenient set of containers may be used to measure the materials, but they should be of equal or known capacity.

The amount of water for a given amount of cement is the most important item in obtaining the desired strength in any kind of concrete work, and once the correct amount of water is obtained, this same amount should be carefully measured each time for the same amount of cement so long as the conditions remain the same.

Sawdust in piles always contains more or less water. The amount has been observed to vary from 15 per cent to 200 per cent of the weight of the dry sawdust. Dry sawdust will absorb and hold 100 per cent of its dry weight without liberating any of this water to dilute the glue-like properties of the cement. Likewise, if the sawdust be dry it will absorb all the water which has been added to the mix to make the cement paste.

In order to determine the amount of water in the sawdust, several trial weights may be made as follows: Obtain the entire supply necessary for the job and place it in one pile. Using a bushel measure as a convenient container, weigh a container level full, loose measure. Repeat the operation by obtaining samples from three separate parts of the pile, being careful to get relatively average samples. Do not tamp the sawdust in the container.

Take the average weight of the three samples (the three weights should be nearly equal), and from the weight in the accompanying table for one bushel of moist sawdust the total number of gallons of water is given. This figure is prepared to include all the water that is to be added to the mix; no more or no less should be added. The amount of water is stated in gallons required per bag of cement for a mix of 1 to 3½. Where the quantities of cement are decreased per batch the water should be reduced in like proportion.

The sawdust should have been well mixed and kept covered with damp burlap bags during storage. In event the sawdust becomes wet from rains, after the weight of absorbed water has been determined, the process will have to be repeated to determine a new water content.

Mixing Methods

In mixing cement-sawdust concrete the cement and sawdust are first placed in the mixer and mixed dry for about ½ minute. All the water is then added gradually and the entire contents mixed for not less than 4 minutes. The material should then take on a light fluffy appearance, somewhat resembling the consistency of whipped cream. The material is now ready to be placed on the floor.

The mixer should be kept turning as long as any material remains in the drum. All the concrete should be

Should the mix appear too dry or placed before another bach is mixed. too wet, it is recommended that the weight and water content of the sawdust be redetermined as a check.

Water Required Per Bag of Cement

Weight of loose sawdust for varying moisture content in pounds per bushel										Water to be added to mix, per bag of cement
10.5	12.0	13.75	15.5	18.0	22.0	23.8	25.0	26.0	27.5	10 gals. 9½ " 9 " 8¼ " 7 " 6 " 5¼ " 5 " 4¾ " 4¼ "
0%	25%	50%	75%	100%	125%	150%	175%	200%	250%	Per cent moisture

Note:—The amount of water shown includes that water held by the sawdust when wet, for a stated mix of 1 to 3½ by volume.

Example:—Average weight of three test samples is 18.0 lbs. In the table pick out 18.0 lbs. In the column at the extreme right you will read 7 gallons of water. This is the total amount of water to be added to the mix.

Mix for Abrasive Resistant Floor

When excessive wear is expected because of cleaning operations and where heavy equipment may be moved over the floor, an abrasive resistant surface should be placed. Such a surface may be obtained by introducing sand into the mix for the 1-inch wearing surface only. It is recommended that the sand be screened through a fine screen and be free from clay or humus material.

The mix recommended for such a surface is 1 volume of cement, 1½ volumes of fine sand and 3½ volumes of sawdust. All quantities should be measured loose. No additional water is necessary on account of the added sand. This mix is only intended to be used as a wearing course which is to be placed 1 inch thick upon the 2-inch base course, mixed as previously described without sand.

The function of the sand in the wearing course is to act as a filler between the grains of sawdust. During the finishing operations, the sand works towards the surface and produces finally a more dense, watertight and wear-resistant surface.

Placing the Concrete

The base course is poured first, completely laying the 2-inch course for one section of the floor. The material is lightly but well tamped in place and leveled off with a strike-off board or wooden float. Care should be exercised to fill all holes or foot marks made during finishing operations. As soon as one section of the base course has been completed, the surface, or wearing course, is immediately applied.

Great care must be used in placing and finishing the surface course, in order to obtain a smooth and water-repellent surface. The material may be spread with a board or a long handled wooden float. It must be finished with a steel float.

Curing the Floor

All concrete work should be kept constantly damp for at least 7 days to prevent evaporation of the water placed in the concrete. It is suggested that the finished floor be protected from the heat of the sun. As soon as the surface is hard to the touch, about 12 hours after it has been poured, the floor should be covered with about 1 inch of loose sawdust and sprinkled with water. This sawdust should be kept thoroughly damp for 7 days.

Under no circumstances should the floor be walked upon during the curing period. At the end of the 7-day period the loose sawdust should be removed and the floor allowed to dry for 3 days. At the end of the 10-day period, the floor may be put into use and light equipment may be installed. Cement-sawdust concrete does not harden so quickly as ordinary concrete, and no heavy loads should be placed on the floor for 28 days.

Ventilation of Poultry Houses

The Health and Productivity of the Flock Are Greatly Affected by the Ventilation

VENTILATION of poultry houses is necessary to provide fresh air so that the birds will perform their body functions better and remain in good health, and it is also necessary to remove the moisture given off by the birds in their breathing and in their droppings.

It is estimated that 100 laying hens give off between three and four gallons of moisture each day. If this water is not removed, the litter becomes damp very quickly, and during the winter months, frost will form on the walls and ceiling.

The information on ventilation given here is very largely an adaptation of the recommendations of W. C. Sanctuary, Massachusetts State College, whose ideas have proved practical under all kinds of conditions. The editors of Everybodys Poultry Magazine have seen difficult ventilation problems overcome by poultry raisers who adopted some of his ideas on restricted ventilation.

There are two general systems of ventilation. One is open-front ventilation, which is questionable as a ventilation system. The other is the restricted front system of ventilation, of which there are several variations.

Open Front Ventilation

In the open front method of ventilation in a poultry house, most of the heat and bad air are removed very rapidly and replaced just as rapidly by outside air, cold or warm, dry or wet, depending upon the weather. Open front ventilation works best in dry locations having good soil and air drainage and a moderate climate.

An open front house should be at least 24 to 30 feet deep with partitions at frequent enough intervals to form pens that are much deeper than they are wide. The walls should be tight in construction, and in the winter months all ventilation should be from the front only.

Roosts should be near the rear wall opposite the front opening. So as to provide some element of protection for the birds while on the roosts, the rear wall, ceiling and sidewalls of the end pen should be insulated around the roosting quarters.

In case the temperature outside becomes extremely low, it is advisable to have burlap frames available to put into the front openings to prevent too rapid interchange of the air. Care must be taken not to stop too much of the ventilation, for the house may easily become stuffy and too warm.

Large numbers of poultry raisers have houses which really use the open front method of ventilation during the greater part of the year, but trouble often occurs in bad weather when the house is closed too tightly for the comfort of the birds.

Restricted-Front Ventilation

1. Slot System

Under the restricted front method of ventilation, the idea is to maintain a temperature during the winter months well above that outside by recirculating the heat given off by the birds so as to remove the moisture from the house and bring in fresh air.

This system of ventilation may be used in practically any location, damp or dry, but a dry location is preferred. When used in well insulated houses where the ventilation is properly regulated, the birds should not be affected by changes in the weather outside, there should be no trouble with freezing of drinking water, the litter should remain dry and the danger of respiratory troubles should be greatly reduced.

Insulation Helps Ventilation

Restricted front ventilation works best in an insulated poultry house, for better control of the circulation of air is secured and there is less danger of the moisture in the air condensing on the ceiling or walls than would be the case in a house of single thickness in the wall and ceiling construction.

It is also desirable to have a concrete floor or one directly on the ground rather than a wood floor set up on posts. There is nearly always a lot of trouble with condensation of moisture on the floor of a house which is constructed on posts and has cold air circulating from below.

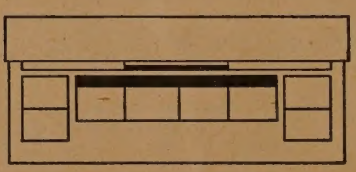
The details for the construction of the ideal front for restricted ventilation will be found on page 48 containing the plans for the Massachusetts Laying House.

"The ideal front for restricted ventilation consists of a combination of adjustable windows and ventilating slots," declares Professor Sanctuary. "The windows may be single or double hung sash (the latter for deep pens as in remodeled barns) or a combination of the two. These may be equipped with ordinary window glass, glass substitutes, or paraffin muslin, but preferably with some non-ventilating material that will admit light. A material like untreated muslin ventilates most in windy weather when

Adjustments for Windows and Slots

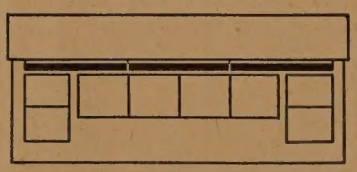
Cold, Windy Winter Day

Circular drafts are prevented by ventilating from the center



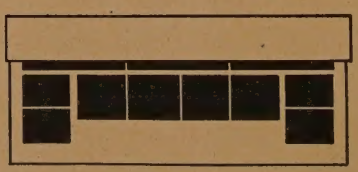
Cold, Still Winter Day

Open middle slot and the upper part of the center windows.



Foggy, Still Winter Day

Open upper slot and drainage slot; keep windows closed.



Summer Day

Open all slots and windows, including openings at rear.

ventilation is least needed and almost not at all in foggy, rainy still weather."

The ventilating slot will vary from 4 to 8 inches wide, depending upon the depth of the pen, and there should be three or four such slots to a house 20 to 24 feet in width. The shutters for these slots will consist of simple boards hinged at the top to swing out and make their own over-hang to prevent storms from beating into the house.

Regulating Ventilation

In driving storms, it may be necessary to ventilate entirely with the upper slots, closing all of the window openings. To secure further ventilation, however, additional air can be allowed to come in through the drainage slots and rise up between the outside and inside sheathing to empty into the house midway between the floor and the ceiling. This movement of air can be started simply by turning back the hinged sill. The detail of the construction of this drainage slot is indicated on the diagram on page 48.

Satisfactory results with restricted front ventilation will depend greatly upon the skill and judgment of the flock owner in regulating the openings, but the following general rules can be set forth:

Summer—Open front as much as possible in combination with through ventilation from windows or slots at rear of house.

Spring and Fall—Close rear openings and end windows. Ventilate with middle window and slots.

Winter—Ventilate with upper portions of the central windows and the upper slots.

Windy, Winter Weather — Upper portions of the central openings and the middle upper slot.

Severe Weather—Middle upper slot only partly open.

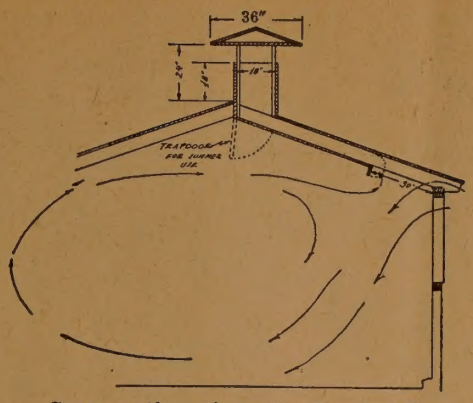
Foggy, Rainy Warm Spells—Open all upper slot valves and sometimes the lower slot valves.

2. *Extended Flue*

The extended flue system of ventilation, also recommended by Massachusetts State College, uses the recirculation principle of the restricted front plan. Its use is limited, however, to the two-thirds or even span roof in single story houses and to the upper stories of multi-deck houses and remodeled barns which have the same type of roof.

Construction of the extended flue is given in the accompanying diagram. One flue is recommended for each pen. The portion of the flue above the roof should be about 2 feet high. In length, it should be the distance between three rafters, approximately 4 feet, and in width from 18 to 24 inches. This large size is necessary to move more air out of the house in the summer.

On the inside of the house, the flue becomes double and extends toward the front plate between three rafters just under the roof. This portion of



Cross-section view showing details of extended flue construction.

the flue is made by fastening plaster board, insulation board, roofing paper or similar material to the under side of the three rafters. It extends to within 18 to 20 inches of the front plate.

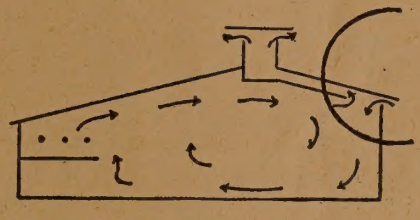
Directly opposite these extended flue openings at the lower end, the space above the plate in the front wall is left open. All other similar spaces above the plate are closed. The over-hang of the roof makes these two intakes practically weather-proof, so there is no danger of rain or snow driving into the front of the house.

The top of the flue on the roof may have a sheet of insulating board fastened to its under side. The edges of this flue head should extend beyond the vertical sides about one and one-half times the vertical distance of the flue opening. This opening may be made adjustable in size by supporting the top portion with four corner posts which may be raised and lowered and fastened at any one point by means of bolts. This opening may be reduced for winter requirements.

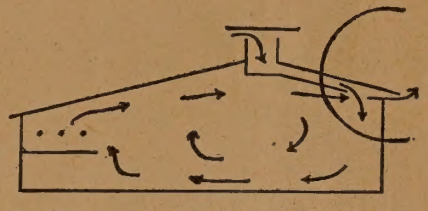
Must Use Judgment

No matter how ideally constructed a ventilation system may be, its successful operation still depends a great deal upon the judgment of the flock owner in making the right adjustments according to weather conditions. General rules can be laid down, but the same type of poultry house will ventilate differently when in different locations.

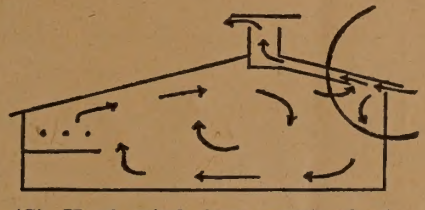
Air Circulation with Extended Flue System



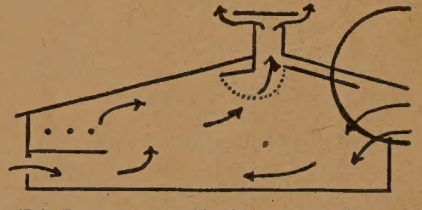
(A) Cold, no wind, maximum recirculation and retention of body heat.



(B) Wind blows down the flue, but does not change the circulation.



(C) Hard wind from south short circuits gap without changing the circulation.



(D) In summer displacement circulation through trap door keeps house cool.

In (A) it is seen that the circulation is the same as for restricted-front ventilation. It is also seen that all the ventilation openings are within a circle including the upper one-third of the front wall and a similar distance up the roof from the front plate. It is recommended that all winter-time ventilating openings be kept within this circle.

In (B) a strong wind is causing a downward circulation in the extended flue. This often occurs in home-made flues that have no back draft devices built into them. This downward direction of air flow, however, is producing no change in the type of recirculation inside the pen.

In (C) a strong south wind is causing the flue to draw more rapidly. Because intake and outlet are both within the circle and, therefore, close to each other, some of the increased flow of air jumps across the gap and short-circuits. Thus, the device is seen to be partially automatic, tending to reduce the amount of increase in net circulation as the wind increases. Many tests with smoke have proven this to be true. It is to be kept in mind, however, that this ventilating device is very efficient and therefore control valves are recommended to close off one and occasionally a portion of the sound intake in exceptional weather.

In (D) the trap door near the ridge is opened for summer use and displacement circulation is in operation, the heat now being displaced instead of conserved.

All-Season LAYING SHELTER

How to build a low-cost shelter to house early pullets or hens that still have some months of profitable egg production ahead.

By ROY E. JONES
Connecticut State College

UNDER the existing economic conditions of the poultry industry, every poultryman realizes the necessity for having either a barracks house or some laying shelters to accommodate the old hens when pullets are ready to go into the laying houses.

With early-hatched pullets coming into production in July and with the old hens still held in production through the fall months, it is possible to get two seasons of high egg price and one season of low egg price out of the first laying year. Following this practice means keeping more laying hens and getting greater volume of egg production from July 1 to January 1 than from January 1 to July 1—a practice which spells profit according to farm management studies.

Uses of All-Season Shelter

Those who have a large permanent brooder house, that is suitable for a laying house during the fall months, have little need for laying shelters, but many who are not in that position are forced to allow pullets to lay on range or sell the old hens while they are still in profitable production. Laying shelters are the answer to this problem.

A laying shelter must, first of all, be a low cost structure, else one might better build a barracks house which can be used the year 'round. The laying shelter most commonly used during the past few years usually has an even-span roof with wire sides. The season of use is from June to October.

The Connecticut All-Season Laying Shelter has been developed to provide a longer season of use which may start with finishing broilers from March on and it may be used for laying birds from June until December. It may even be used for housing surplus breeding cockerels during the entire winter, giving it year 'round use.

The cost is as low as a building suitable for long-season use can be constructed. The size is 24 x 24 feet. The roof, which is even-span, can be boarded and papered or covered with galvanized iron. Under New England conditions, where much hurricane lumber is available, boards and paper are considerably cheaper. Eighteen-inch blind-nailed paper is advised.

This shelter has adjustable sides which can be opened and closed readily when necessary.

The roosting pit is placed across the back of the pen, the nests are on the side walls and the entire floor is free for feeders.

Holds 300 Hens

This shelter will accommodate a maximum of 300 hens. The cost of material is about $150. It should be fastened down with concrete posts and should be supplied with running water and electric lights. The shelter may be operated with or without a yard. A yard is not advisable unless a large area is available. The adjustable sides provide ideal summer conditions, protection from the sun and heat with a constant movement of air.

The long season of use and the greater comfort of the birds justify the additional expense compared to the ordinary laying shelter with wire sides only.

Building Instructions

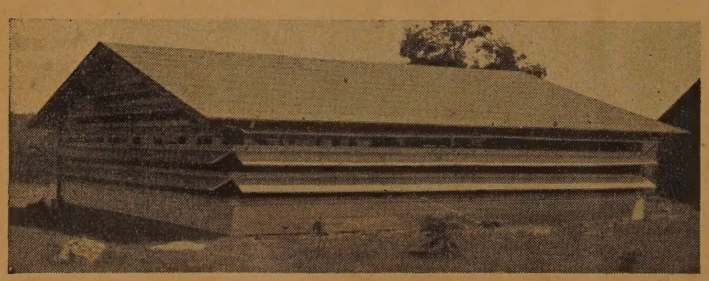
The Connecticut Cold Weather 24 ft. x 24 ft. Laying Shelter with adjustable sides is designed to meet the needs of the ordinary summer laying shelter plus protection early in the spring and late in the fall for young stock, laying hens or surplus males. Using wire only on the sides and using egg cases or orange boxes for nests will reduce the cost about 25 per cent but the length of service per year will be reduced about 50 per cent.

Foundation — Concrete blocks with anchor bolts at the corners, the center of each side and beneath the center post, are suggested for the foundation of the shelter. However, a low stone foundation may be used. A dirt floor is suggested as the dirt floor seems to be satisfactory and economical for summer shelter use.

Sills—Sills are 2 x 4's spiked together.

Studding—The studding is 2 x 4 doubled at the corners, cut out for a ribbon board and spiked to the sides of the rafters.

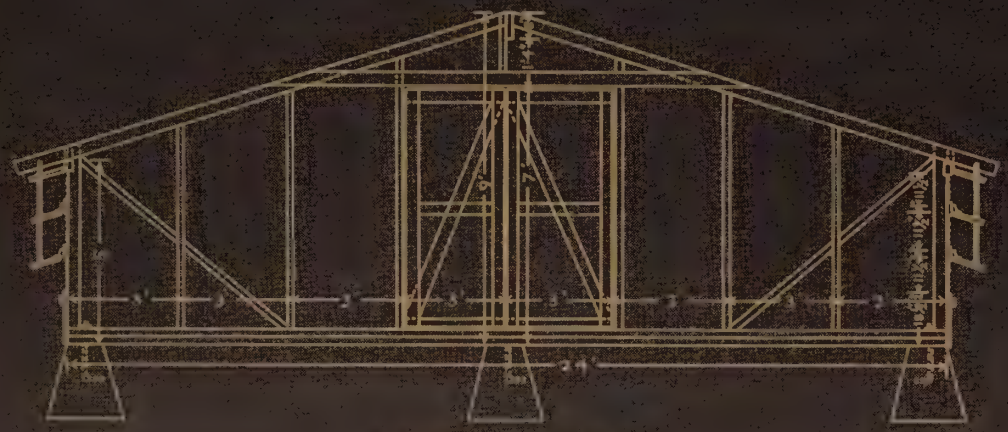
Center Post—The center post is made of three 2 x 4's spiked together, each out-



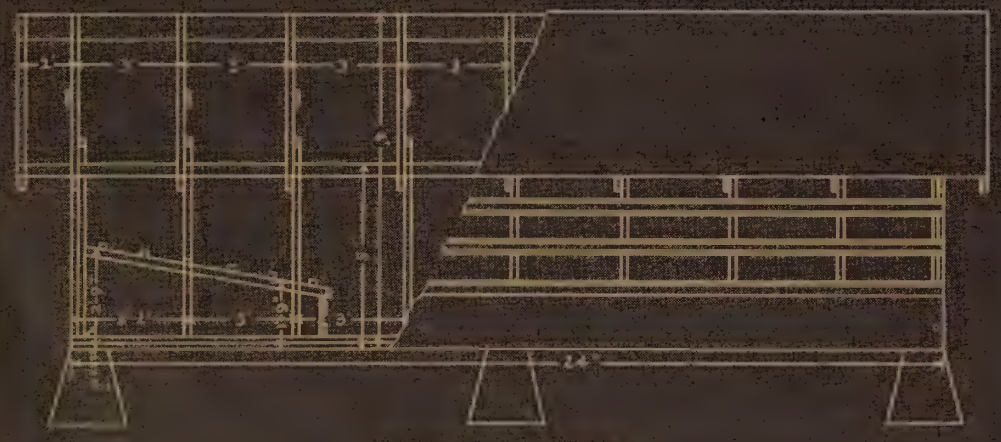
Adjustable sides provide complete protection from the heat of the sun in summer, yet permit free movement of air.

24' × 24'

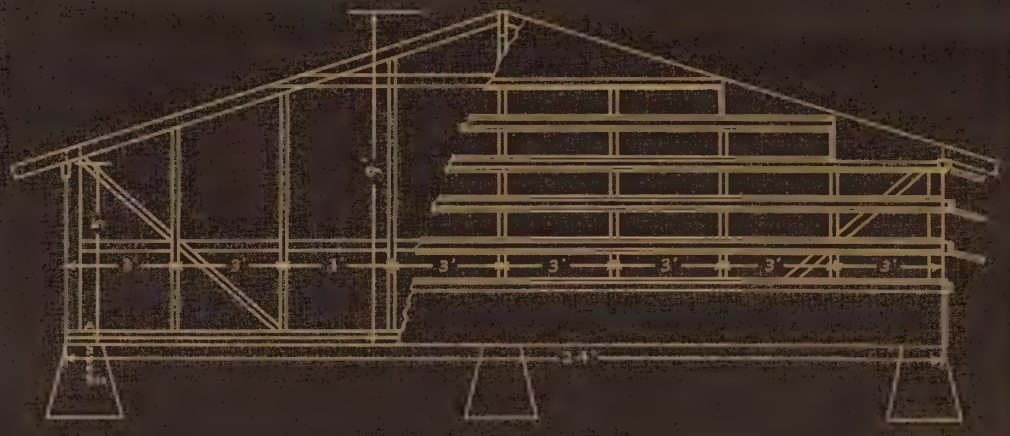
ALL-SEASON LAYING SHELTER



FRONT VIEW



SIDE VIEW



REAR VIEW

side 2 x 4 being spiked onto the sides of the ridge board.

Braces—The braces are placed on each side of the corner posts. These braces may be cut, allowing the studding to run straight through.

Ribbon Boards—2 x 4 ribbon boards cut 1 in. into the studding are used to support the rafters. The ribbon boards extend 2 ft. beyond each corner supporting the rafter beneath the projection.

Rafters—The rafters are 2 x 4's, 14 ft. long set 3 ft. apart on centers with the end projections extending out 2 ft.

Ridge Board—The ridge board is a 2 x 8 placed between the rafters because the full rafter length is needed to obtain sufficient overhang to protect the ventilating boards on the sides.

Roof Boards—The roof may be boarded with ordinary roofing covered with paper or with boards placed about 3 ft. apart on the rafters for the purpose of supporting corrugated iron in case the iron roof is preferred.

Roof Paper—Eighteen-inch blind-nailed paper is advised for the roof. This paper withstood the hurricane in exposed positions and promises to be most satisfactory for this particular type of roof.

Ventilation Boards — Ventilation boards on the side walls and rear end are 12 in. boards 12 ft. long hinged at the top to swing out. The boards are supported in an open position by a 4 in. hook fastening the top board to the rafter, and 10 in. hooks between each ventilating board below. When putting on the side walls, the wire should be nailed to the studs first. 1 x 4's should be nailed in horizontal position with 1 x 2's on the 1 x 4 providing a closely fitting joint of the ventilating boards when closed.

The ventilator board construction at the rear end is the same except that two 9 ft. boards and one 12 ft. board have to be used at the top because of the slanting roof.

Corner Finish—Because of the fact that the sides and back are 24 ft. long and the two ventilator boards are 24 ft. long, a piece of 2 in. x 2 in. 5 ft. long should be nailed onto each outside rear corner for finish.

Side Wall Boarding — Matched boards may be used for the lower part of the wall on the sides, the front, and the rear, also for the top of the rear wall at the peak of the roof.

Roost—The roost frames are 2 x 3's, 7 ft. x 12 ft., with six 2 x 2 roosts on each frame spaced about 14 in. apart at the centers. These two roost frames are placed against the rear wall of the shelter, 2 ft. 9 in. high at the rear and 1 ft. 9 in. high at the second stud, 6 ft. from the rear of the building. Perpendicular boards are nailed on the inside of the roost frame reaching down to the floor of the building. Horizontal boards are nailed beneath the front of the roost frame to make this opening hen-tight. Heavy wire should be nailed on the roost frame beneath the roost. One inch by two inch mesh wire, 14-gauge electric welded is recommended. Twenty-four feet of this wire 3 ft. wide and twenty-four feet 4 ft. wide are required to cover the roost frame. One by two inch mesh wire is better than the inch and a half diamond mesh 16-gauge wire ordinarily recommended because eggs laid while birds are on the roost at night do not drop through the wire. The roost frames should be hinged with three 6 in. strap hinges on the outside ends. These hinges may be fastened to the corner post and the first and second studs. It is necessary that the roost frame be hinged on the end rather than the back wall. Otherwise, the roof does not permit room for lifting the roosts.

Nests—The nests are built against the side wall on whichever side may be most convenient. The nests are built exactly the same as the nest plan in the Connecticut 24 ft. x 24 ft. House Bulletin — 16 nests long and 3 nests high. The nest floor, which is 16 in. wide, is built 4 in. below the level of the lower side ventilator opening with 12 in. boards cut 16 in. long used for nest partitions. Each nest floor above will be about 4 in. below each ventilator opening, allowing maximum ventilation for the nests and the house. The nest floor for the second and third tiers of nests is movable, being supported by the nest frame below. The nest partitions are held together by a 1 x 4 running lengthwise at the bottom of the front of the nest and two 1 x 2's running lengthwise on the top of the nest partitions. The front 1 x 2 is nailed on flush with the front of the nest partitions. The rear 1 x 2 is nailed on 4 in. from the rear end of the nest partition to allow room for the studs. Wire should be placed about the top tier of nests to prevent the top of the nest being used as a roost. The 1 x 4 lighting boards should be hinged to the front of the nest with a 6 in. T hinge. The strap end of the hinge should be fastened to the lighting board by only the last two screws. This keeps the lighting board out from the front of the nest when opened and in the proper position to effectively close the nest when lifted. These nest frames should be fastened to the studs by means of hooks. Otherwise, they will work forward and allow the nest litter to sift out. (See nest construction on page 31 of Bulletin No. 284.)

Doors — The two front doors are each 3 ft. wide and 6 ft. 8 in. high, made of 1 in. x 4 in. material covered with wire. The wide door allows for backing a light truck into the shelter for cleaning if desired. Hen exit doors can be cut in the side wall if a yard is available.

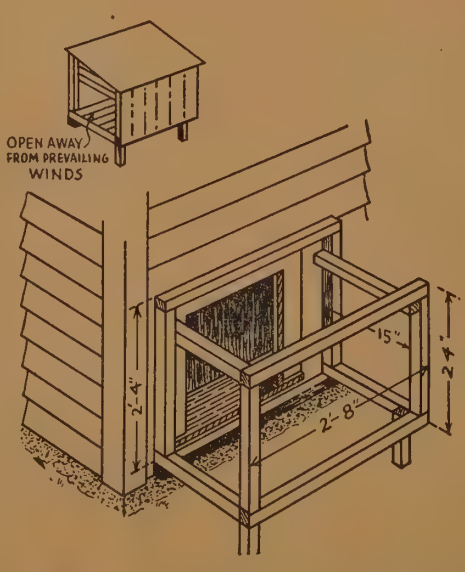
Wire for Sides — 3-foot, inch mesh, 19-gauge wire is suggested for the side walls, the front and the rear. One 3-foot strip of wire is sufficient for each of the two sides. Two strips will be required at the rear and two, plus the wire left over from the rear wall, will be sufficient for the front.

Cost Estimate — The cost estimate for this shelter for all material is $150.

Capacity—The capacity of this shelter is estimated at 250 to 300 birds.

Exit Guards

Wind-breakers just outside of the exits of your poultry houses offer protection against drafts on the floor when you leave the exits open. These guards can be made easily of plain boards, enclosing all but one side so the wind cannot sweep directly into the house.



Persistent broodies should be confined to a broody coop, provided with a slatted or wire floor, making it impossible or at least uncomfortable for the bird to sit.

Care of Roofs

Leaky roofs usually result from the improper construction of the original roof. With a roof that has as little pitch as the average poultry house, it is almost necessary to use a composition roll roofing or a built-up type of roof.

Ninety per cent of the trouble experienced with composition roll roofing comes from the fact that not enough attention is given to the way it is nailed down. If the roof is nailed in the cracks between boards, or in the tongue-and-groove of boards, the nails are not tight and the water seeps in around the nail head. With frequent freezing and thawing, the nail is soon raised up and a leak develops.

Careful attention should be exercised when the roof is laid, to see that all the nailing is done near the center of the boards. The nails should be driven down tight so that there is no possibility of the water seeping in around the nail head. It is for this reason that many prefer to use a smooth surfaced paper rather than one which contains some gravel, as they claim that the gravel will not permit the nail heads to sink into the paper and so make a water tight joint around the nail head.

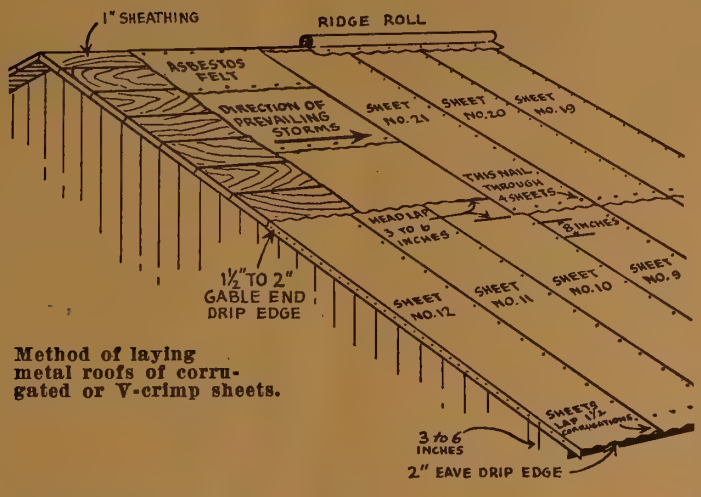
On rainy days, the house should be marked on the inside to show the position of the leaks. Afterwards, when the roof has dried off, the parts of the seams which are leaking should be painted with a hot asphalt lap cement. A strip about 6 inches wide should be painted along the seam; this should be covered with a strip of muslin of equal width and the muslin painted again with the hot asphalt lap cement. Before doing this, however, it is wise to go over that section of the roof and see that all the nails are driven in tight. If they are, this method of repairing will keep the nails down.

The life of composition roofs can be greatly lengthened by regularly painting the entire roof with a hot asphalt cement. This should be done at least every three years.

Ohio State Bulletin 94

Application of Metal Roofing

By PAUL F. WORCESTER



Method of laying metal roofs of corrugated or V-crimp sheets.

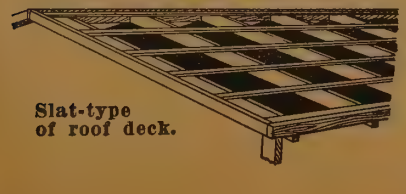
METAL roofs for poultry houses have become more popular in recent years. Despite their additional rigidity, when compared to other types of roofing, they do require sturdy support. Thin, decayed sheathing will fail to hold nails in heavy winds and metal sheets may be ripped off and strewn over the countryside. One-inch sheathing of sound lumber is necessary on solid decks.

If you are applying metal sheets to a new building, some cash will be saved by using the slat type roof deck. Slats of 1-inch hard wood or 2-inch soft wood are the minimum for adequate support for the corrugated or V-crimp sheets. Purlin type decks are satisfactory for some purposes, but the gradual slope of poultry house roofs necessitates too much bracing, and they are not recommended.

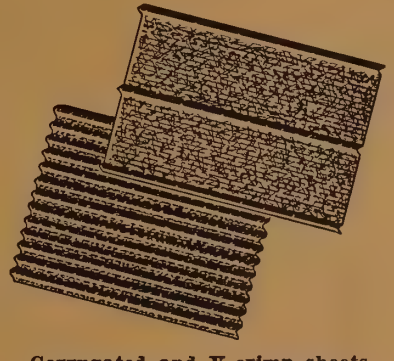
The slope of roof and other factors will determine the type of metal roofing used. See your dealer for recommendations and prices.

Local climatic conditions will determine whether or not you will need a felt or asbestos felt base beneath the metal. A layer of felt will act as an insulator, keeping the house warmer in winter and cooler in summer, and will prevent any condensation on the sheets.

You will save money by having your dealer measure the roof and order materials for you. Sheets come in various lengths, and allowances must be made for side and end laps. Make sure that the proper length lead-headed nails are ordered. The lead is forced into the holes as nails are set and prevents leaks and rusting. Special sticks are used with most types of V-crimp sheets and best results will be obtained by using those especially cut by the manufacturer.



Slat-type of roof deck.



Corrugated and V-crimp sheets.

The first sheet should be put on the end of the roof away from the direction of prevailing winds so storms will not drive into the laps. Place the first sheet with an overhang of 1½ to 2 inches at the side and at least 3 inches at the bottom. The side overhang should be bent over and nailed. Outside sheets should have a nail every 8 inches. Drive the nails at an angle through the corrugation or crimp so as to get a real bite into the wood.

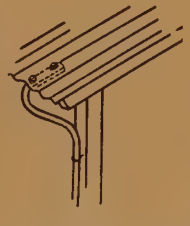
Unless the manufacture recommends to the contrary, place the second sheet above rather than to the side of the first sheet. This results in a greater interlocking of sheets at the point where the most strain is exerted.

Continue across the roof, allowing plenty of lap at the side and end. A 3 to 6-inch end lap should be made with corrugated sheets and at least 6 inches with V-type roofing. Side lap on the V-types is fixed. One corrugation will be sufficient on 2½-inch corrugated roofing, but one and one-half corrugations are necessary on 1¼ or 1½-inch corrugations.

Method of nailing

The gable on the far end should be protected by bending the metal edge over, as on sheet No. 1. Take up any extra material by having a greater side lap between the last sheets. Although roofing can be hammered down to make a fair ridge, it is advisable to use a manufactured ridge-roll. The cost is little and added protection great.

Be sure to ground the roof for protection against lightning. On most small structures, one ground pipe will be enough. On larger buildings, ground diagonal corners.



Longer life for the roof and cooler temperatures for the birds will result if a coat or two of light-colored or aluminum paint is applied to the metal. If your roof has a slope of less than 3 inches to the foot, corrugated sheets may require the use of a paste paint sealer, composed of dry oxide of iron and raw linseed oil. This is applied at side and end laps.

In choosing the brand of roofing to use, do not place too much emphasis on price. The gauge (thickness) of the metal is of great importance because of the extra rigidity afforded by heavier sheets. Look for a statement regarding the amount of zinc that has been applied to the steel sheets. All galvanizing methods are not the same and only the products of manufacturers using approved zinc application methods, putting on enough zinc to assure long life, should be considered.

Metal roofs should be inspected annually, and painted every three to five years. The heavier the zinc coating, the longer the life of the galvanized sheets. Keep a few lead-headed nails handy, preferably ones of a longer size than those originally used, and replace loose nails as soon as they are noticed. Proper application plus proper care will assure you of years of service from any metal roof of reliable manufacture.

This laying house consists of four 22 by 22-foot units and is 88 feet in length.

HOW TO BUILD A 22x22 Insulated Laying House

By Thomas E. Moncrief

ANYONE who has passed along the highways, and has seen many of the good poultry farms in York County, Pennsylvania, undoubtedly has noticed a great similarity in the style of fronts and in various other features of construction of the laying houses. The hood on the front to keep driving rains from blowing into the houses and to keep the hot rays of the summer sun from pouring directly into the houses, is one of the most conspicuous features.

Another noticeable characteristic is the tongue and groove siding which is used. It is applied vertically rather than horizontally, because it reduces the amount of heavy lumber needed for framing. We might attribute this feature to the thrift of the Pennsylvania Dutch.

If we would attempt to trace the ancestry of these particular features in laying house construction, we would probably find that they have been adopted so generally in this section of Pennsylvania because of the influence of Guy A. Leader. During the past 29 years, he has built his plant up to a capacity of 11,000 layers, and the style of poultry house which he has used so effectively has appealed to the many folks who have visited his farm.

Mr. Leader recently completed the construction of four laying houses measuring 22 by 88 feet. We are, therefore, presenting the construction details of a single 22 by 22 unit of this multiple unit laying house.

Capacity for 150 Layers

Mr. Leader keeps about 150 Leghorns in each unit. This allows a little more than 3.2 square feet per bird. The long gravel runway in front of each house affords the birds opportunity to get out during the day, even in bad weather, so that there is plenty of floor space for that number of birds.

"The foundation for our laying houses is stronger and better than that used by many people in their own homes," asserts Mr. Leader. After the trench is dug for the foundation, a 6-inch layer of concrete is poured, and the first row of concrete blocks, 6 by 8 by 16 inches, is placed in the moist concrete.

Warm, Dry Concrete Floor

The concrete floor used in these new houses has been found to be the driest of all the floors in the laying houses on the Leader farm. First, a 1-inch layer of gravel is spread over the ground which has been leveled off. Then, cinder blocks, 4 by 5 by 12 inches, are placed over the gravel. Following this comes a coating 1⅛ inches thick of concrete, consisting of 5 parts of sand and limestone siftings to 1 part of cement. There is no chance for the ground moisture to work its way upward.

The framework is strongly anchored onto the foundation. Short 2 by 4's are tapered off and driven into the openings in the concrete blocks at frequent intervals along the foundation, and these are then sawed off even with the top of the blocks. The 2 by 6 sills are then spiked to these 2 by 4's.

Less Lumber Needed

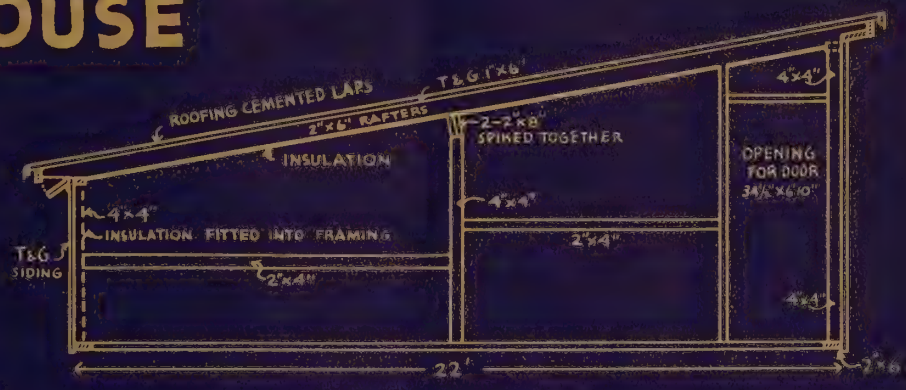
By running the tongue and groove siding up and down, a great many of the 2 by 4 studs are eliminated, which makes a material saving in the cost of the house. This sheathing is applied, of course, to the back framing before the rafters are laid.

It is interesting to note that on all four sides of the building, the sheathing is run an inch or so below the top of the concrete block foundation, so that there is no opportunity for water to seep through between the sill and the foundation.

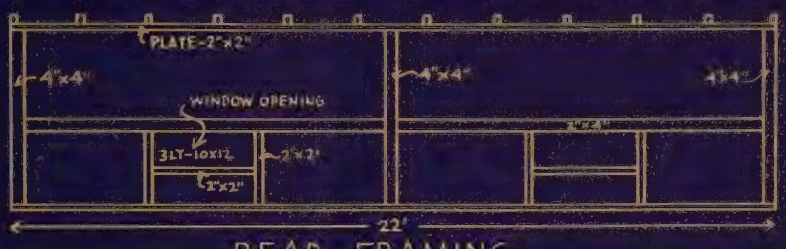
As you will notice from the picture and the blue print, there is a window at each end of the front of this 22 by 22 unit, with two large openings in between the windows. There are nine panes, 8 by 10 inches, in each half of the window. The top of the window

This is a view of the 22 by 88-foot laying house at the rear. The ventilators under the eaves are open, as are the rear windows.

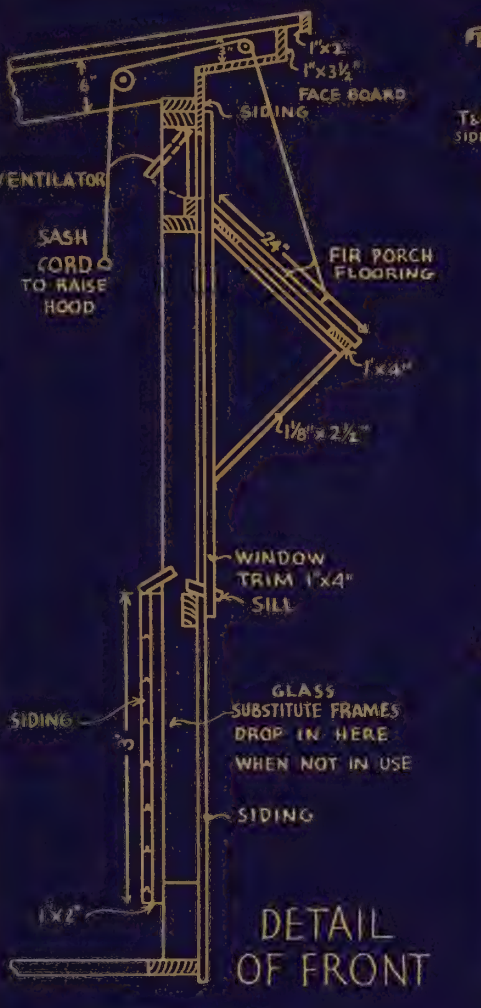
22′ × 22′ INSULATED LAYING HOUSE



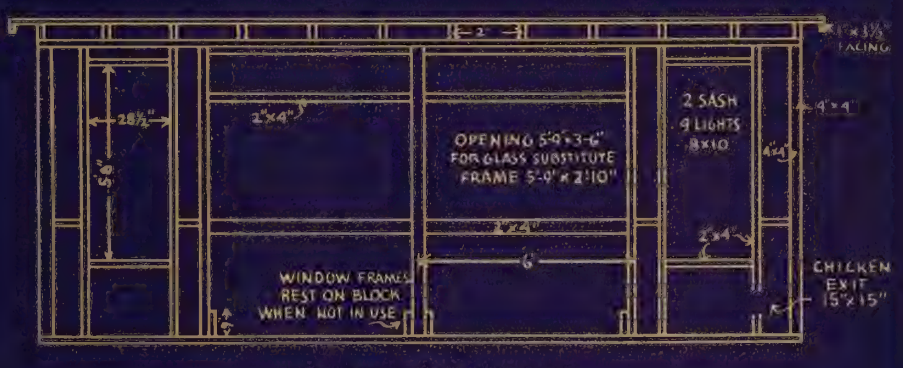
END VIEW



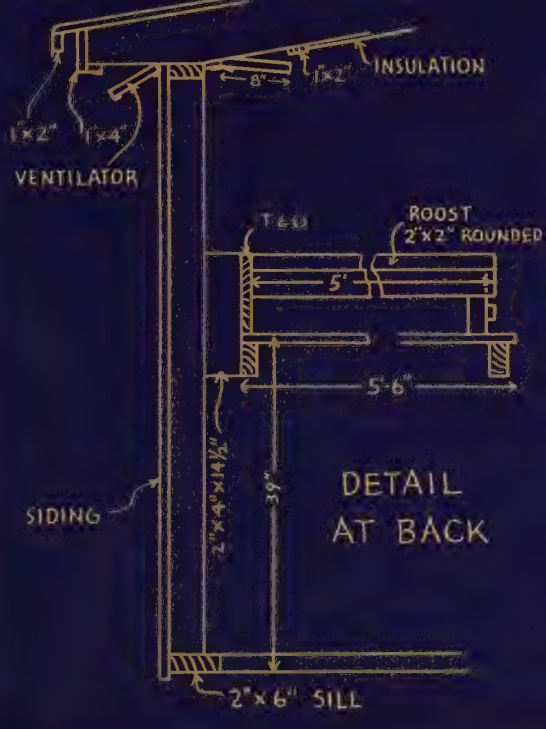
REAR FRAMING



DETAIL OF FRONT



FRONT FRAMING



DETAIL AT BACK

FLOOR PLAN

sill is 2 feet, 4 inches from the floor, and the entire length of the window is 5 feet, 8 inches, thus coming within 9 inches of the 2 by 4 supporting the rafters.

Openings for Glass Substitute Frames

Each of the large openings between the windows in the front of the house, is 5 feet, 9 inches long and 3 feet, 6 inches wide or high. Wire fabric is nailed across one of the openings, while on the other opening the netting is fastened to a framework which can be removed for such occasions as cleaning out the pen. The bottom of these openings is 3 feet, 7½ inches from the finished floor.

On the inside wall is a framework into which glass substitute windows are dropped during fair weather, or at any time that the owner decides to open up the front. These can be pulled up quickly in cold or rainy weather. These frames for the glass substitute are only 34 inches high and 69 inches wide, so that a small opening is always left.

Each unit has a small entrance at one corner of the front for the birds. The opening for this door is 15 by 15 inches, and it is flush with the sill. The door in the end of the house is 3 feet wide and 7 feet high.

At the rear of the house are two more windows to let light in under the dropping boards and to provide more ventilation when necessary. Each of these windows have three 10 by 12 inch lights. The openings are covered on the inside with 2 by 2 inch hardware cloth, and the windows are hinged at the top so as to swing outward and to be fastened to the back wall.

4-Inch Corner Posts

Each corner of the house has a 4 by 4-inch post and there is one of the same size in the middle of each side. A center post made of two 2 by 8-inch boards in the center of the building supports two boards of the same size which run across from the 4 by 4 on one side to the 4 by 4 on the other side, supporting the rafters.

The height of the building from the floor to the top of the plate at the front is 8 feet, 5 inches, and at the rear it is 5 feet, 10 inches, on the inside. The height of the concrete block foundation will vary with the slope of the land. The wall may be a foot or more above the finished floor. This will alter the length of sheathing that will be necessary for the rear wall.

Construction of Roof

The construction of the roof of this house is one of the most interesting features, since it involves many particulars which are worthwhile and of value to the poultryman, no matter what type of house he is erecting.

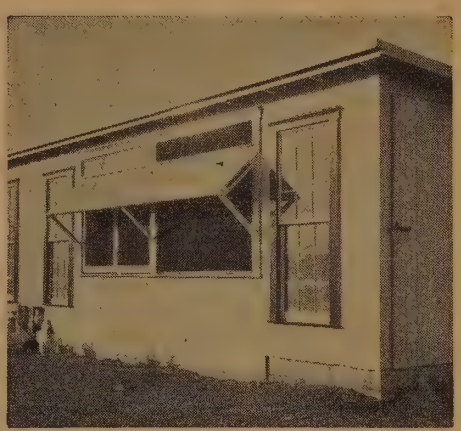
The front of the 2 by 6 rafters extend 9¼ inches out beyond the face of the building. Face boards cover the lower part of these 9¼ inches. A 1 by 3½-inch face board is nailed on to the end of the rafters, extending down ½ inch, since the rafters are only 3 inches thick beyond the front of the building. The 1 by 6-inch tongue and groove sheathing is laid across the rafters, the first board extending 3 inches, or half its width beyond the rafters. Nailed to this 1 by 6-inch board is a 1 by 2-inch face board, flush at the top of the roof, and extending down 1 inch.

The roof extends 10 inches beyond each side of the building, provided there is just one unit of 22 by 22 feet, and a 1 by 3½-inch faceboard is nailed along the edge from the front to the rear of the building.

Effective "Double-Drip" Feature

Roofing paper is then put on, and to make this "double-drip" system even more effective, the roofing material goes past the ends of the roofing boards and down about ¼ inch below the facing boards on all four sides. This absolutely stops any water from dripping down along the rafters and leaking through into the house. In fact, with the roofing paper extending down so low, the face boards are protected and have no chance to rot.

The roof at the back of the building brings up another feature which must be explained. The 2 by 6-inch rafters running down along the roof, project 9¼ inches, the same distance they did in the front of the building, but in the rear they are sawed so that they are perfectly level. On the end of the rafters is a 1 by 5⅝ inch face board. Above it, of course, are the tongue and groove sheathing boards, with the last one extending out 1½ inches beyond its face board. The roofing in the back also laps down over the edge and runs about ¼ inch past the bottom of the 1 by 2 inch face board on the edge of the last sheathing board.



This view shows the front of the 22 by 22 unit with the hoods down and one of the two ventilators above open.

This view shows one of the hoods raised to permit the sun to shine directly into the house on a winter day.

Rear Ventilation Opening

Along this level portion on the bottom of the rafters a panel is fastened on hinges, to swing up, closing the distance between the edge of the building and the end of the rafters. This board is 1 by 7⅝ inches and joins with a 1 by 1½ inch board to fill the opening. Hinges are fastened to the back wall and the panel can be raised or lowered very easily. Since a wooden thumb-screw would not work if the board were to swell, a window sash lock has been found very effective in keeping the board locked.

On the inside of the building there are 1 by 8 inch panels extending across the back which are hinged at the 2 by 4 plate, and drop down along the back wall when the ventilators in the rear are left open. Window sash locks hold these shut to a 1 by 2 inch board extending across the ceiling.

Front Ventilators

Besides the ventilators in the rear of the building, there are two ventilators above the large openings in the center of the front. These are each 5 feet, 9 inches long, and 12 inches wide. They are hinged so as to swing inward. A facing board 1½ inches wide and planed from 1½ inches down to ⅜ inch runs along the lower outside edge of the ventilator so as to keep the water from running into the house.

The hood on the outside of the house is made of fir porch flooring. It is hinged at the top and is let down during the summer to keep out the sun. By having the front and rear ventilators open, the front and rear windows open, and the hood down, the house is very comfortable even on a hot summer day, and with the windows all closed and the glass substitute windows brought up in the center openings, the house can be quite comfortable for the birds in the coldest kind of weather.

Insulation Board Used

The walls and ceiling of this house are covered with insulation board, making a very attractive interior, as well as a warm room in the winter and a cool one in the summer time. When asked if he thought insulation material was worthwhile, Mr. Leader replied, "Yes, considering the last few winters and summers we have had, I certainly do. In those pens on our farm where we had insulation last summer, the production did not drop nearly as fast or as low as in those pens where no insulation was used. And the birds in the insulated pens were soon up to normal production again, while the birds in the uninsu-

lated pens never did recover entirely."

There is no doubt but that insulation helps to keep up the lay in both the summer and the winter.

Dropping Boards

The top of the dropping boards is 3 feet from the finished floor in the front, and 3 feet, 3 inches from the floor at the rear. This slope of 3 inches makes the boards much easier to clean. The boards are 5 feet, 6 inches wide, and extend across the back of the pen.

The roosts are made of boards 2½ by 1¾ inches, and the tops are rounded off. Instead of running parallel with the back wall, they run at right angles to it. The first roost is 8½ inches from the side wall, and 13 inches are allowed from the center of one roost to the center of the next.

Beneath the roosts is 1 by 2 inch heavy muskrat fencing. At the back of the roosts is a 2 by 4 to keep the droppings from falling back, and to prevent any drafts below the birds.

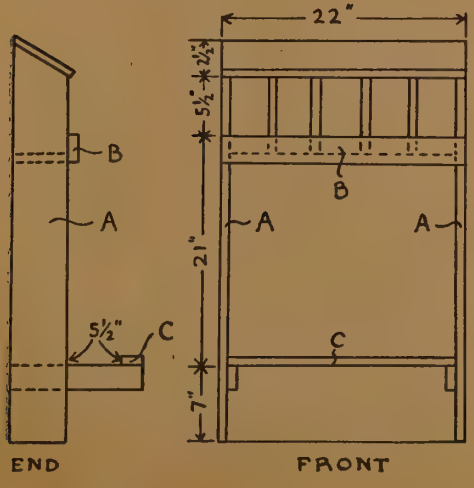
Hopper for Male Birds

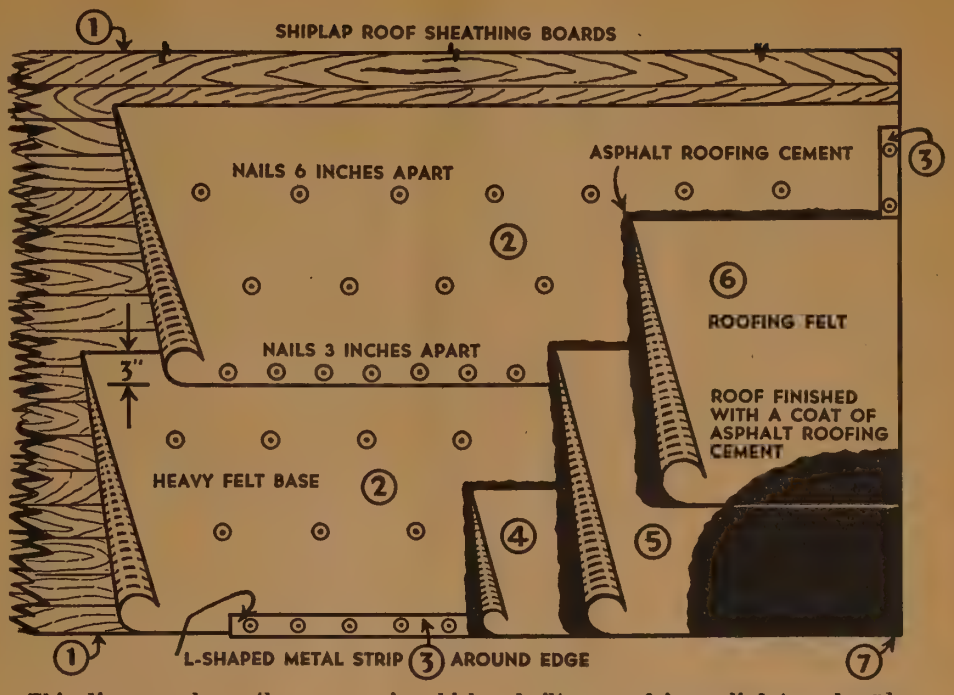
Gallant male birds often become so attentive to the hens in the breeding pen that steps must frequently be taken to increase the feed consumption of the males. A poultryman in eastern Pennsylvania who ran into this trouble, devised a special cockerel feeder which is shown in the accompanying sketch.

The principal measurements for the feeder are given on the sketch. One-inch thick lumber should be used throughout to make the feeder substantial, but half-inch wood can be used for the partitions.

The sides (A) of the feeder are made of 1 by 5-inch lumber 36 inches long with the top cut in the manner shown in the end view. The perch (C) on which the bird stands when eating is made of 1 by 2-inch wood as are the perch supports. The same is true of the board (B) which helps to form the feeding compartment.

By keeping corn in this feeder which is out of reach of the layers, the male can eat whenever he feels so inclined, and the danger of a loss in weight is decreased.





This diagram shows the manner in which a built-up roof is applied to a board roof. (1) The felt base (2) is applied to the sheathing and the edges are protected with a strip of metal. (3) Roofing (4, 5, 6) is applied as described in this article, and asphalt (7) is then applied over the entire roof.

How to Construct

A Built-Up Roof

Built-up roofs are not new for the large, more permanent types of buildings, but they are a rather novel feature in poultry house construction. The built-up roof seems to meet all the requirements for a good poultry house; it is wind-proof, durable, necessitating a minimum amount of upkeep to maintain it in good condition, and it effectively sheds the water.

Various methods of applying built-up roofs are employed, but the procedure followed by the Ohio Experiment Station at its poultry plant, where more than 6,000 square feet have been laid, will be discussed for the most part.

Materials and Equipment—Common tar paper or two-ply roofing paper and asphalt are the materials to be used. The equipment consists of a large kettle to heat the asphalt, a thermometer, a hard cord mop with hard, twisted cords about one-fourth inch thick. Roof-paint brushes may be used when prepared liquid asphalt is applied.

Application—Nail a 12-inch strip of tar paper or slater's felt paper around the lower or drip edge of the roof and over the end edges. Then paste the tar paper lengthwise across the roof, beginning at the eaves, and lapping about 3 inches at the seams. When applying a new roof to wood sheathing, the asphalt is spread at frequent intervals, here and there, in order to make the roofing less subject to the strain or buckling due to contraction and expansion, which result from changes in temperature.

The paper is laid quickly on the asphalt in order to make a strong attachment to the roof. After the first layer of paper has been completed, the same procedure is repeated for the second covering, except that this time the first layer of paper is entirely covered with hot asphalt. A layer of hot asphalt or a coating of some suitable roofing paint is necessary after the second layer is finished.

Prepared liquid asphalt is preferred by some because it sets more slowly than the hot asphalt and thus is more convenient to use. The prepared product remains elastic longer than crude asphalt which must be heated, and thus makes the roofing less subject to strains of contraction and expansion.

When the crude product is heated for use, it should be kept at a temperature of 130 to 140 degrees Fahrenheit only as long as absolutely necessary before applying.

A third coat of paper and asphalt may be applied at any time that it is necessary for maintenance of the roof.

Repairing Old Roofs—In repairing old roofs so that built-up roofs may be used, the first procedure is to drive down all protruding nails. Any decayed sheathing may be replaced, and wrinkles may be removed by slitting the wrinkles lengthwise with a knife and nailing flat against the sheathing. One or two layers of built-up roofing may be applied, according to the condition of the roof. The first layer should have a complete coat of asphalt in this case.

A 2000-Hen Laying House

By HOBART CREIGHTON

Warsaw, Indiana

THE laying houses we use on our farms were originally designed for hogs. When we changed from hogs to chickens, we overhauled our hog house and made it into a laying house. This house worked so satisfactorily that the same cross section has been used in the construction of nearly all of the laying houses we have built since that time. This type of house has become quite popular in Indiana and surrounding states.

The basic plan is so simple that it can be readily adapted to suit the needs of large, medium or small size flocks. Some houses are 30 feet long, while others are over 200 feet in length. Some poultrymen are bolting in one end. When a large house is needed, the bolts can be removed and the house extended to the desired length. The house is complete by bolting the old end onto the new section.

Advantages of Large Houses

For a commercial poultryman, there are advantages in a large laying house. A 30 by 210-foot building accommodates 2,000 laying birds, 1,000 in each end. There is a feed room 10 by 30 feet in the center section of the house with feed bins sufficient to hold a 10 day's supply of feed and large enough to furnish sufficient space to case eggs and do other necessary work.

A 30-foot house has sufficient width to enable better arrangement of furniture than is possible in narrower buildings. A great deal of furniture is required in a laying house. Feeders, water fountains, nests, dropping boards or pits, and other special articles are necessary in furnishing a laying house, and all these things take up floor space.

There is ample room on the front (or south) one-third of our house to accommodate all the water fountains and feeders necessary. The nests are hung on the wall at the back (or north) side of the house. The nest bottoms are removable, which aids in cleaning. The boards forming the floor of the nest merely slip out from one end; most of the litter will drop on the floor. The perches and dropping pits are on the back side of the house. The pits are covered with 1½ inch netting which keeps the birds from the droppings. The perches form a convenient waiting place for hens when they are looking for open nests. One nest is provided for each five hens. Six perches on each perch frame give over 6 inches of space for each hen. The hens spend more of their daylight hours on the perches where pits are used than they do where dropping boards are used. The low perches seem to offer a greater inducement to perch than the higher ones. The pits are easily cleaned and, contrary to the ideas of many people, do not give off a foul odor, even if left for weeks without cleaning.

Driveway Through Center

The center third of the building is not used for any equipment. It does have a use, however, in addition to providing a space for the chickens to scratch. If desired, some of the feeders can be shifted over to the center section. We use it primarily, however, as a thoroughfare through which we can drive the manure spreader for cleaning.

Rubber tired equipment is used on our farm. The spreader is backed in the building, generally by hand. We start cleaning out the section next to the feed room and work toward the end door. There is no litter to clean up on the outside of the building and no carrying of litter on wheelbarrows. If the house is 100 feet or less in length, we recommend placing the feed room in one corner of the building, using the driveway to pass entirely through the building from one end to the other.

Ventilation Plan

This house is ventilated by doors and windows. We have found that by opening the windows in winter, according to the weather, we can provide sufficient ventilation. The insulation makes it possible to maintain a comfortable temperature in all kinds of weather conditions.

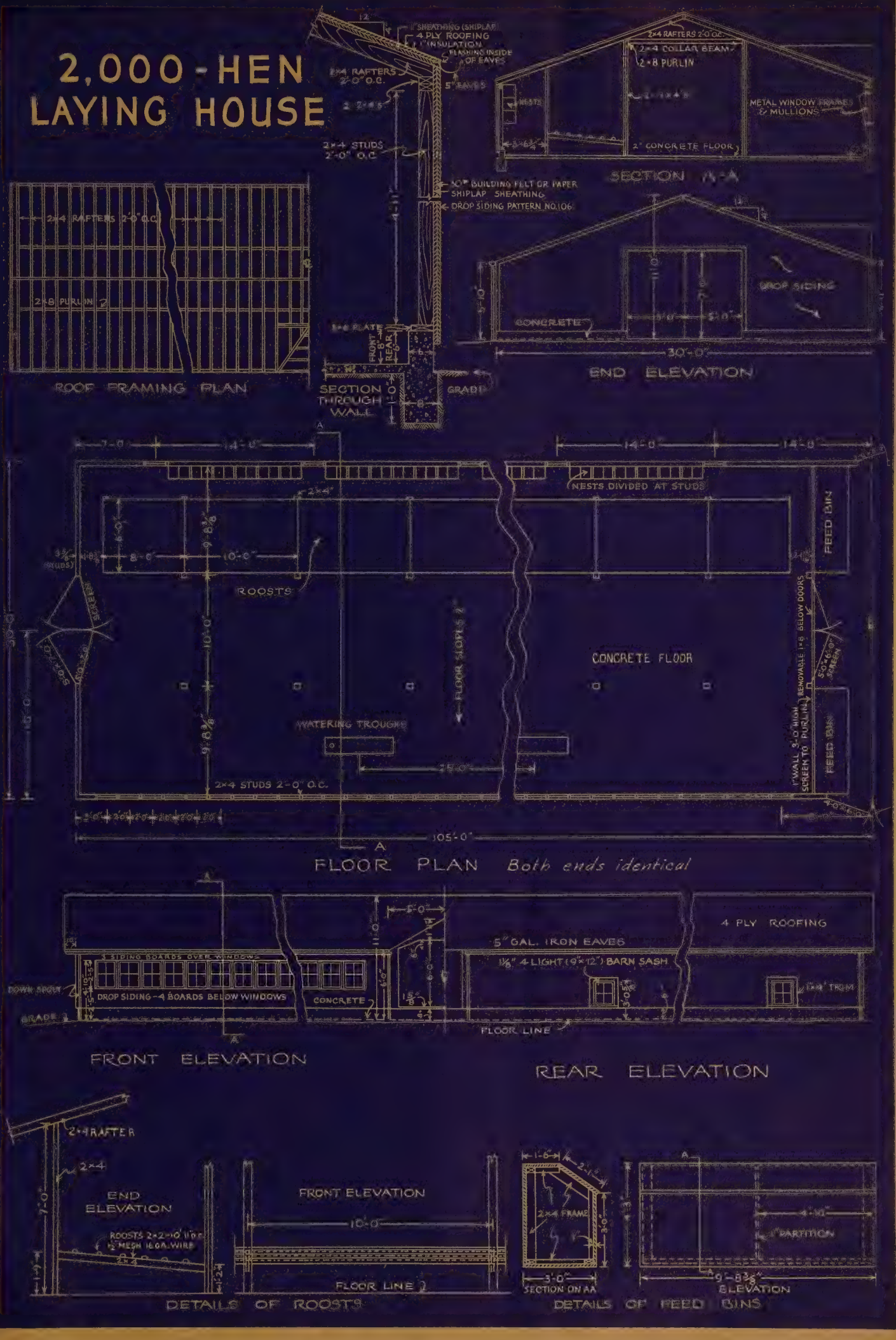
Water pipes make it necessary to maintain a temperature above freezing. In sub-zero weather, we sometimes start fires in hard coal stoves. A little heat helps to dry out the house. The stoves we use are base burners, discarded from homes in favor of more modern heating equipment. The pipe passes out the roof through a sheet metal roof stack. Hard coal stoves are preferred because they furnish more even heat and the stove pipe does not get as hot as with soft coal or wood.

More information regarding the construction of this building may be of value to persons considering use of these plans. We use a concrete wall and floor. The floor, of course, should be higher than the ground level at the highest point around the building. We like to locate the building on a spot that is well drained and, if possible, on light soil.

Framing Construction

We use 2 by 6 sills, which have been treated with a wood preservative, and

2,000-HEN LAYING HOUSE



2 by 4 studding, the lower ends of which have also been treated. The humidity in a laying house is high, especially close to the floor, and wood treating makes the sills last much longer. The studding on this house are cut 4 feet 11 inches long and a double 2 by 4 plate is placed over and spiked to them.

The rafters are notched and spiked to the 2 by 4 plates. The rafters are supported by a 2 by 8 purlin plate resting on posts at intervals of 10 feet. We use 2 by 8's 20 feet long as purlin plates which give greater rigidity to the building than 10-foot pieces would. Each rafter is lightly notched for the purlin plate and spiked to it, so that this plate is properly aligned. The rafters are nailed to a ridge board.

The posts are formed by spiking two 2 by 4's together, notching them so that the purlin plate rests on the top of one and is spiked to the other.

The side and end walls are made of shiplap siding covered with a layer of 30-pound saturated asphalt felt which in turn is covered with drop siding. This provides a warm construction. The felt stops the moisture before it reaches the outer siding, protecting it from decay and keeping the paint from scaling off.

Roof Construction

The roof is constructed by placing a layer of shiplap over the 2 by 4 rafters. This is covered by a 1-inch insulating board securely nailed with 1¾-inch galvanized roofing nails. The insulation is covered by a built-up roof consisting of a layer of 30-pound felt mopped on the insulation by hot asphalt and two layers of 15-pound felt mopped on, and, finally, a top mopping of hot asphalt.

Before the roofing is put on, but after the insulation has been applied, the metal apron for the eave trough is nailed in place. The roofing covers the metal.

Minor Details

We use metal window frames on the south wall. There is a solid row of these windows, four light, 9 by 12, giving an actual glass area on the south of 5 per cent of the floor space. The windows on the north side provide light on the back part of the house as well as an outlet and inlet for the birds in summer.

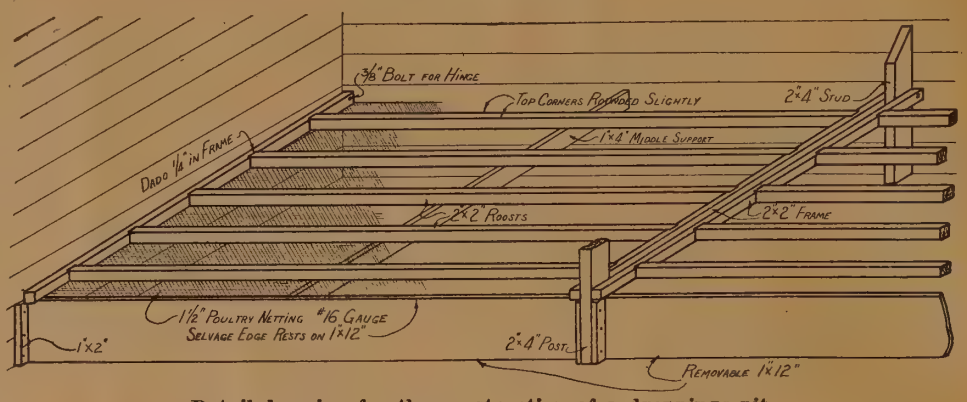
The sash tilt inward to provide ventilation, protecting the house from rain and permitting adequate ventilation during the colder part of the year. In summer, the sash on both the north and south sides are removed so that plenty of ventilation is provided. Netting is placed over the openings during this period. Our end doors are open day and night in the summer screen or netting doors being provided to confine the birds when desired.

The house is wired for electricity and water pipes are laid under the floor.

This makes an attractive house, with lots of room and very convenient arrangement. It is rapidly growing in favor in the Midwest and, in my opinion, serves the need of the commercial egg producer or breeder very well.

BILL OF MATERIALS

75 Barrels Cement.
75 Yards Gravel.
Sills—480 lineal ft. 2 x 6.
Side Studding—108—2 x 4—10'.
End Studding—20—2 x 4—16'.
Plates—804 lineal ft. 2 x 4.
Rafters—216—2 x 4—16'.
Purlin Plates—21—2 x 8—20'.
Posts—80—2 x 4—9'.
Collar Beams—20—1 x 4—10'.
2500 ft. Shiplap and 2500 sq. ft. Building Paper.
Siding—2500 ft. 1 x 6, Pattern 106.
96 Steel Window Frames for 4-light 9 x 12, 1⅛ in. Sash.
Window Trim—7—1 x 4—16' Redwood or Fir, (Rear).
Hardware—300 No. 8d and 100 No. 16d and other Items to Suit Purchaser.
Doors—25—1 x 8—14' and 13—1 x 8—10' Redwood, Pattern 116.
Perch Frames—36—2 x 2—8' and 84—2 x 2—10', 30—2 x 4—12', and 40—1 x 2—6'.
Dropping Pits—800 ft. No. 2 Shiplap and 10—2 x 4—16'.
Nests to Suit Purchaser.
Eaves and Metal Edge Strips—416 ft. Eaves with Apron and Down Spouts and 80 ft. Edge for roof.
Roof—68 Squares.
68 Squares of 1" Roof Insulation.
Sheathing—7800 ft. No. 2 Shiplap.
Corner Strips—4—1 x 4—12'.
Netting—188 lineal ft. 1½" 6 ft. 16 gauge for Perches, 228—1" x 30", 24—1" x 48", and 60 ft. 1" x 48".
Feed Bins—750 ft. No. 2 Shiplap.
Screen Door Frames—8—1 x 8—14', 8—1 x 8—10', and 4—1 x 8—16' No. 2 Shiplap.
Partitions for Feed Room—16—2 x 4—16' and 16—1 x 8—10' No. 2 Shiplap.
Door Bats—9—1 x 6—10' Redwood or Fir and 8—1 x 6—16' Redwood or Fir.



Detail drawing for the construction of a droppings pit.

The Droppings Pit

Here at the Ohio Experiment Station, we have found the droppings pits very satisfactory in the usual type of unheated laying house, as well as in large rooms or remodeled barns. The removal of the droppings need not be as often as the remainder of the house is cleaned.

We have found that removal of droppings from the pits three or four times a year is all that is necessary. The air does not become foul in the houses because of the accumulated droppings. During most months of the year, the droppings are dry enough to store in feed sacks when removed from the pits. During the late fall and winter when the moisture content is highest, flies are not abundant and do not prove a menace.

Construction of the Pit

The droppings pit is not a pit in the true sense of the word, but serves the same purpose. The roost frame is constructed of 2 by 2's, 8 to 10 feet long, and joined to a 2 by 2 piece on each end by a dado joint and nailed. The end pieces of the roost frame extends 8 inches beyond the rear roost and 8 inches beyond the front roost. The end of the end pieces next to the wall are drilled for a three-eighth inch machine bolt to bolt through a partition, side wall, or studding depending on the length of the house.

The front 8-inch projection of the frame rests on the edge of a 12-inch board forming the front of the pit. The rear side of the frame is bolted slightly higher, ½ inch per foot of width of frame, and the bolts serve as a hinge to tip up roost frame to facilitate removal of droppings.

The roosting space is based on 8 linear inches of roost for lighter breeds and 10 linear inches for heavier breeds. The roosts are 14 inches center to center for lighter breeds and 16 inches for heavier breeds. The loss in floor space is not objectionable because the birds make more and better use of floor space occupied by the roosts than the floor space under the droppings boards. A greater percentage of droppings is collected under the roosts with this arrangement and it tends to keep the litter dryer.

Birds are kept out of the pits by stapeling 1½-inch mesh, 16 gauge wire under the roost frame and a 1 by 4 nailed edgewise under the frame in the center gives added support to the center of the frame.

Since the roosts occupy approximately 25 per cent of the floor area, quite a saving is made in the amount of litter necessary. Pullets may be housed young and will begin roosting at once, and if brooded in the same quarters that later will be used for layers, the roosts can remain as permanent equipment.

No Cases of Bumblefoot

It is often claimed that birds jumping from higher roosts causes bumblefoot and blood spots in eggs. In the case of bumblefoot we have not observed any severe cases during the past three years use of droppings pits.

Poultrymen contemplating new construction of poultry houses or remodeling barns or other large rooms will be interested in considering droppings pits construction for economy of materials, time and labor. —V. D. Chamberlin, Ohio Experiment Station.

A view of the Connecticut 2-story poultry house on the farm of Robert Boas at New Hartford. Feed room is at the left, while a basement room at the right is used for grading eggs and also for storage purposes.

The Connecticut 24x24 Two-Story Poultry House

By Roy E. Jones

FOR many years Connecticut poultrymen have been trying to find a way to construct a poultry house that would offer sufficient protection to avoid the extreme of high and low temperatures, and a type of front that would exclude beating storms from the south. Poultrymen are tired of replacing torn paper, repairing leaky roofs and tacking on cloth curtains.

There is no reason why a poultry house should not be built to last fifty or a hundred years, the same as other farm buildings, providing they are given reasonable care.

The new Connecticut 24 by 24-foot poultry house is a definite attempt to meet this need. For economical construction this building should be for large capacity. It should be two or more stories high with a flat, built-up roof. For most economical operation this house should be built into a hill or on land that is sufficiently uneven to allow unloading a truck on a platform level with the feed room on the second floor.

The outside walls of the house are of shiplap lumber painted, although where cheaper, native lumber is available, the outside walls may be papered. For best results this house should be carefully insulated.

Sliding Windows

The sliding glass windows in the south side of this house are an important development from the standpoint of excluding storms, yet allowing free ventilation at all times. The air intake below the windows should have a 1-inch opening with no adjustment. The air outlet above the windows, or the slot ventilation, should have a 6-inch opening between the floor joists on the lower floor and a four-inch opening below the plate on the upper floor. These openings are supplied with an adjusting board.

Provision for a water system should be made before the poultry house floor is put in. Running water should be available because providing water is the greatest labor item in caring for poultry. Water pipes should be brought in to a dry well located somewhere near the center of each pen, depending on the pen arrangement. If the sub-soil is gravelly or porous, a well with an interior about the size of a barrel carefully stoned up will accommodate the water pipe inlet and take care of drainage water from the fountain. If the soil is heavy, hard pan or poorly drained, a connection from the dry well to the tile drains beneath the wall or an outside drain should be provided.

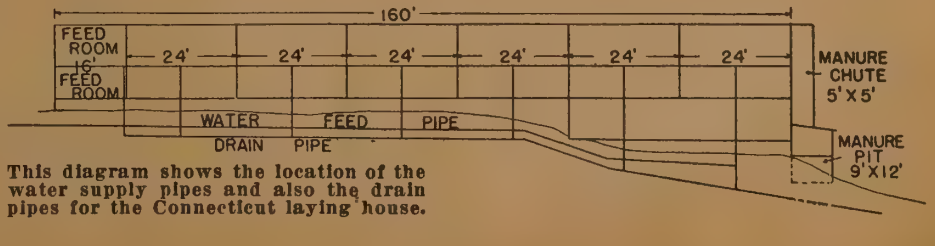
A stop and waste shut-off should be provided in the riser of each fountain unless adequate provision is made to prevent freezing. Continually running water is, of course, the best means of keeping water from freezing. This, however, is not always practical, particularly if the supply is short or if water has to be pumped. A water pan or fountain with an automatic float serves the need very satisfactorily. A small water pan on a wire floor or platform over a larger container or tub placed to catch the drip and drain into the dry well will aid greatly in maintaining a dry floor around the fountain.

A very satisfactory water fountain can be constructed by using a large tile, a galvanized pan and a range float.

For construction such as outlined in this article, stone or concrete foundations are necessary. Buildings with board floors on posts may be more economical under some conditions where the ground is decidedly wet or uneven, or where single-story construction better meets the needs. Stone or concrete foundation and walls should not give trouble due to moisture provided they are properly constructed with tile drains beneath the walls where needed and sufficient grade away from the building to take care of surface water. The grade should be one foot lower than the top of the wall at a distance of four feet from the building. Poultry houses with concrete floors are usually warmer, drier and more even in temperature than houses with board floors. Board floors on the second or third story are warmed by the pens below.

Laying the Foundation

A poultry house foundation should be started by establishing levels and putting up lines with a floor pitch of four inches from back to front. A trench eight inches to a foot wide should be dug beneath the wall of the house, the outside of the trench being even with a line indicating the outside top of the finished wall. The depth of the ditch should be such that the bottom will be approximately two



This diagram shows the location of the water supply pipes and also the drain pipes for the Connecticut laying house.

and one-half feet below the outside grade when construction and grading are finished. Should there be any evidence of danger from water working beneath the foundation, a tile should be laid at the bottom of the outside edge of the ditch and a suitable drainage outlet provided.

The ditch may be filled with loose stone up to within a few inches of the surface. If a stone or concrete wall is to be laid, it should be continued from this point. If a smooth outside wall surface is desired, the rafters to be used in the building may be used for building forms. Rafters are much better than boards for this purpose because they are stiffer and more easily held in place.

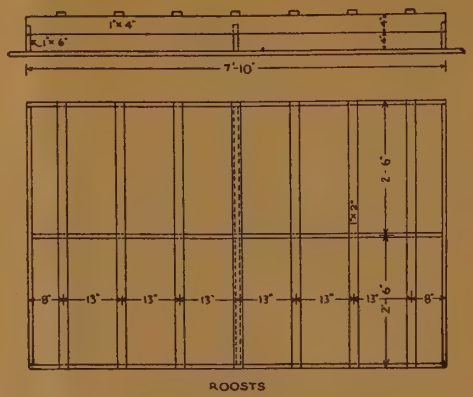
If a reasonable supply of stone is available, there is no need for a form on the inside of the walls as this can be of rough stone construction with concrete between the stones and against the form on the outside.

The floor foundation should be filled in with stone and leveled with gravel or cinders. If the foundation has been carefully tamped so that it will not settle and the concrete is made from good material, well mixed, the concrete floor needs to be only two or three inches thick. Use a 1-2-3 concrete mixture, that is one part cement, two parts of sharp sand and three parts sifted gravel or crushed stone. The concrete should be thoroughly mixed, using as little water as possible in producing a mixture that can be handled and leveled; for the above mixture, use 4½ gal. if the sand is damp and 5½ gal. if the sand is completely dry.

Laying the Concrete

If bank run of sand and gravel is used, a 1-4 mixture is best. If conditions are such that moisture may work up from below, use a sub-floor washed over with hot asphalt or, better still, covered with roofing paper. Cement the seams and paint with hot asphalt. The top coat, one inch thick, should be a 1-2-2 mixture if sand and screened gravel are used; or a 1-3 mixture if bank run sand and gravel are used. If the work is done in cold weather, drying may be hastened and some protection from frost provided by adding two pounds of calcium chloride for each bag of cement. This must be dissolved in the water before the mixture is put together.

Bolts should be set in the concrete at the edge of the foundation about 12 feet apart so that the sills can be securely bolted down. As the floor pitches four inches from back to front, drains should be provided beneath the sill in the front of each pen to dispose of water when the floor is washed with a hose. When the floor is ready for construction it should be smoothly finished; dry wells should be provided for the water fountains, the sills bolted down in place and possible air leaks beneath the sill carefully checked by pointing with cement.



The drop boards should be 5 feet wide, 7 ft. 10 in. long, 30 inches from the floor, and run the entire length of the back of the building. It should be built to slide out from the back wall, so that it becomes part of the air circulating system. The roost frames, as shown in the diagram, have the same outside dimensions as the drop boards. The roosts are 1 by 2-inch lumber under which 16-guage, 1½ inch mesh wire has been fastened to the frame to keep the hens out of the droppings and to prevent eggs from going through to the droppings.

Sills—The sills are two 2 in. x 4 in. spiked together. Eighteen-foot lengths are specified because they cut to advantage to break joints and make corners. The sills should be bolted to the foundation and pointed up with cement if necessary underneath.

Posts—Two 2 in. x 6 in. spiked together for posts should set up with 6-inch dimensions lengthwise of the house. The post should be placed 12 feet apart on centers. Double 2 in. x 4 in. studs will serve as posts in the partition. The posts should be cut 6 ft. 2 in. long as this is the minimum head room allowed in the building.

Floor and Roof Supports—The floor and roof supports are three 2 in. x 6 in. spiked together. They should start off at the end of the building with a 12 ft. and two 24 ft. sticks and continue with 24 ft. sticks, which will break joints throughout the length of the building.

Floor Joists—2 in. x 6 in. x 12 ft.—The floor joists may be butted together at the center with pieces of board nailed across the joint to prevent spreading. The floor joists should be placed 2 feet apart on centers.

Rafters—2 in. x 6 in. x 14 ft.—As it will be necessary to purchase 14 ft. sticks, the rafters may be set up to overlap 2 feet. The rafters should extend out 1 foot at the front and the rear for overhang. They should be placed 2 feet apart on centers to accommodate insulation board, which is usually 4 feet wide, on the ceiling.

Studding 2 in. x 4 in. — All studding should be 2 in. x 4 in. running straight through from the sill to the top of the building with balloon-type construction. Ribbon boards 2 in. x 4 in. are set 1 in. into the inside of the front studs. This, with one 2 in. x 3 in. cut in between the studs on the first floor and two 2 in. x 3 in. on the second floor, supports the floor joists and rafters. The front studs, except at each end of each pen, are 3 ft. apart on centers to accommodate the 34 in. windows. The end and rear studding are placed 2 ft. apart. A 1 in. x 4 in. ribbon board is used to support the rear end of the floor joists.

Stud Blocks—The stud fastening on the sill may be greatly strengthened by nailing short pieces of 2 in. x 4 in. on the sill between the studs.

Corner and Partition Braces — Corner and partition braces cut in between two studs at each corner and at each end of each partition on each floor provide a 4 ft. brace and add important wind resistance to the building.

Plate, Rear Two 2 in. x 4 in.—The plate at the rear is two 2 in. x 4 in. The ribbon board replaces the front plate.

Flooring—Full 1 in. or 1¼ in.—A single floor is satisfactory if it is of good quality and a full inch or an inch and a quarter thick. The heavier flooring will be worth while in the long run, although it may be slightly more expensive at the start. If a double board floor is used, the boards should be lapped half and securely top nailed with 10 d nails.

Roof Boards—The roof boards should be of good quality, carefully fitted together and securely nailed. The roof boards should extend out about 8 inches on either end of the buildings to allow for trimming to compare with a foot overhang front and back.

Front Windows—6-light barn sash 10 in. x 16 in. glass and 12-light storm sash 10 in. x 14 in. glass.—The 6-light front windows with 10 in. or 16 in. glass should be placed between studs set three feet apart on centers. Barn sash with 6-light 10 in. x 16 in. glass are 34 inches wide and 37 inches high. The windows should be installed so that the sash will slide down out of sight when the window is open and allow a two-inch lap at the bottom of the window when it is closed. The sash should be held flush with the outside boarding, allowing only sufficient space to slide up and down easily and held in position by a cleat of in-square material nailed against the studs. The cleat should be nailed above the inside boarding at the bottom of the window so that it may be removed and the windows taken out if necessary.

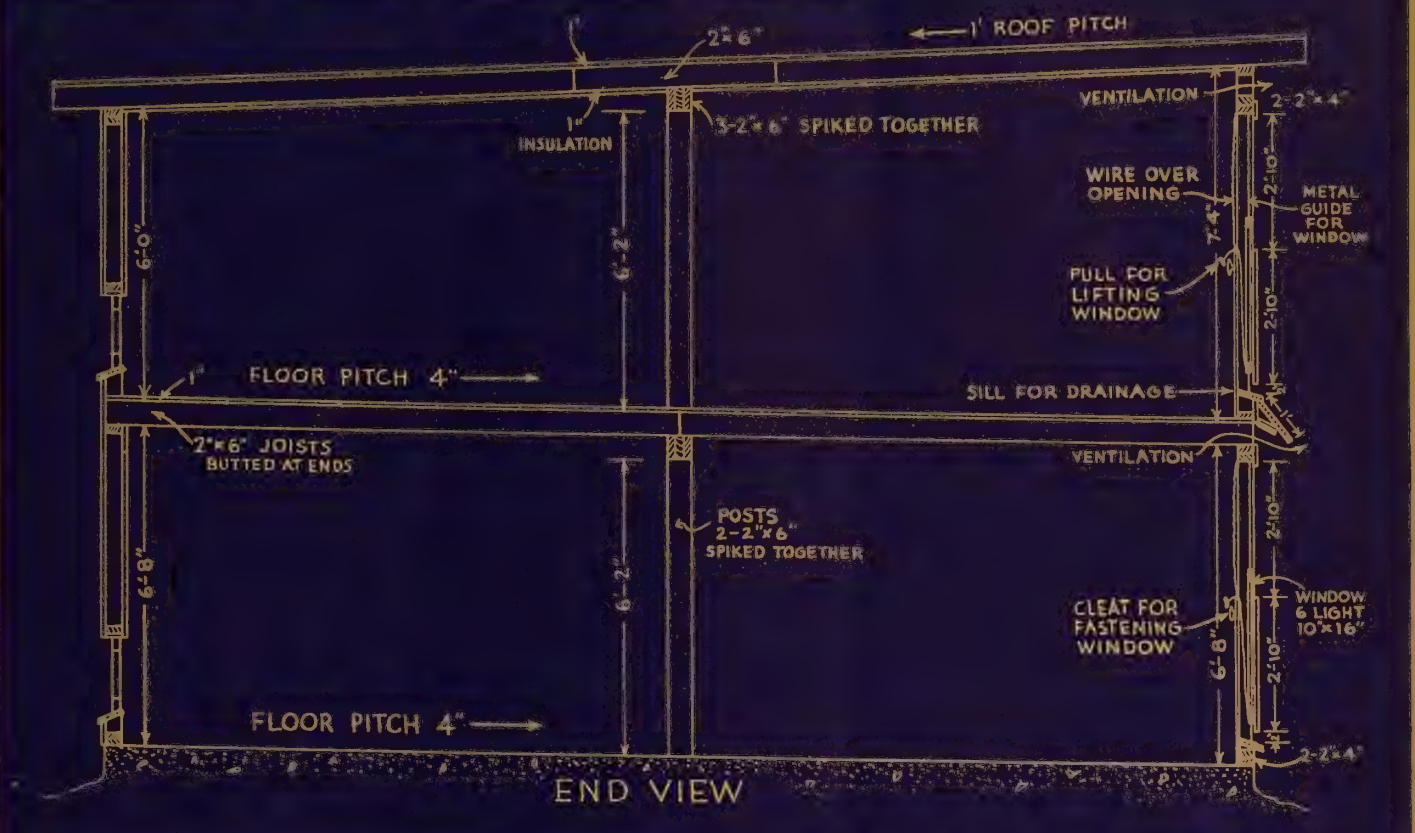
A 1-inch air intake above the sill should be allowed at the bottom of the window as this is a part of the ventilating system. The windows may be raised and lowered by a cord fastened to the bottom of the center of the window frame and passed over a pulley fastened to the plate at center of the top of the window. This cord may have a short piece of 1 in. x 1 in. tied in the end to prevent its going back through the wire screening. When the window is lifted, it may be fastened on a cleat nailed against the boarding on the inside of the front or a special fastener may be used.

This fastener is made from two pieces of 1 in. x 2 in. x 9 in. One piece is fastened securely to the inside boarding below the window. The other is fastened to swing on a screw located three inches from the locking end and a little above the center of the cleat. The six-inch end of the locking cleat supplies weight to hold the cleat in position. The space between the ends of the two cleats should be about half the diameter of the cord used.

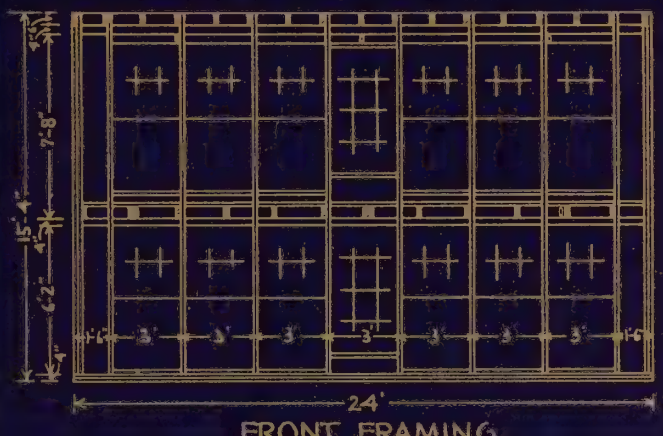
Six of these barn sash are required for each pen. One storm sash 12-light 10 in. x 14 in. glass should be located in the center of each pen, hinged at the side to swing in like a door. A wire door to be used when this window is open should be hinged on the post opposite the side from which the window is hung. This wire should be so constructed that it can be closed to protect the window when the window door is closed, and closed to keep the poultry in when the window is open.

Back Windows—3-light 10 in. x 14 in.—The two sash in the back should be 3-light 10 in. x 14 in. glass cellar sash placed 12 feet apart with the top of the window sill 8 inches above the floor. These windows may be constructed to open by sliding sidewise, sliding up, swinging in or taking out, which ever is convenient. There should be one window in the center of each 12-foot section or two windows in each pen. If pits are to replace the drop boards at the rear, the windows may be increased in size to 6-light 12 in. x 14 in. glass and located near the ceiling hinged at the side to swing in.

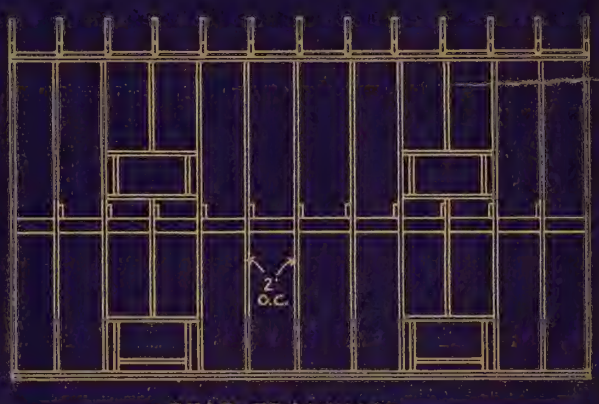
CONNECTICUT 24'×24' MULTIPLE UNIT LAYING HOUSE



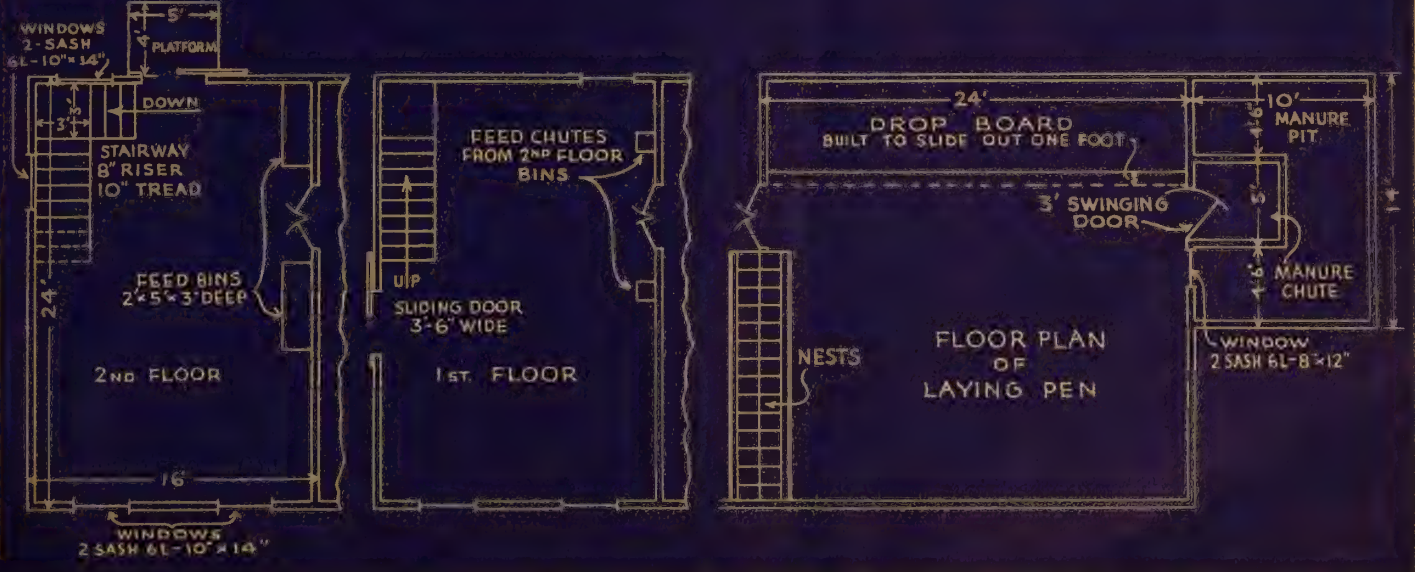
END VIEW

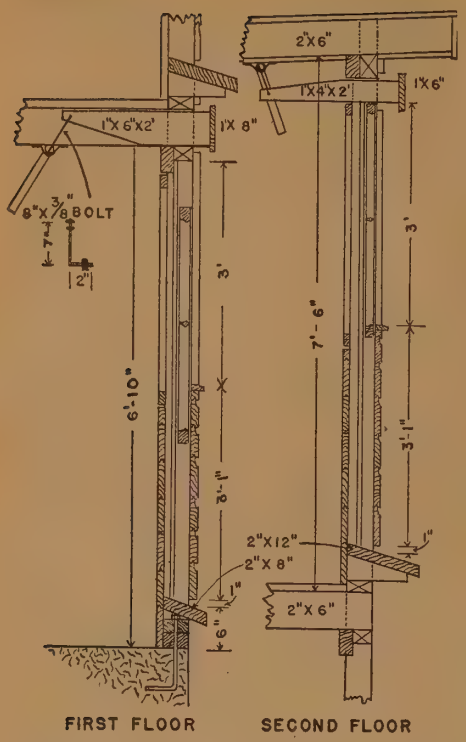


FRONT FRAMING



REAR FRAMING





These diagrams show cross-sections of the front of the first and second floors of the Connecticut house. Instead of hinged boards to control the ventilator opening near the ceiling, it will be observed that a sliding slot ventilator is used. Details of construction are given in the accompanying descriptive article.

Sliding Slot Ventilator — The slot ventilator above the windows allows a 6-inch opening above the ribbon board and between the floor joists on the first floor and a 4-inch opening above the windows and below the ribbon board on the second floor. The first floor ventilator board is 8 in. x 21 ft. and the second floor ventilator is 6 in. x 21 ft. The sliding slot ventilator is held in a perpendicular position and is slid in and out by a 1 in. x 6 in. x 2 ft. piece of board or arm supported by the ribbon board and window trim on the first floor. On the top floor this arm is only 4 inches wide and is placed below the ribbon board where it is supported by the window and trim and a block on the stud inside the window slide. The ventilator board which is 21 feet long may be two pieces spliced together on the inside between studs. The ventilator is operated by a piece of 19 ft. x 1 in. pipe with a 1 ft. elbow at the end for a handle. The pipe is drilled for a rod connection with the ventilator arm and is fastened to the ceiling with pipe clips. The rods are ⅜ in. x 9 in. threaded for a nut each side of the pipe at one end, the other end being threaded for one nut and bent at right angles two inches from the end.

The inch opening above the window sill at the bottom of the window below the front boarding is a cold-air intake and part of the ventilating system. The cold air enters the pen at the top of the inside boarding half way up the front of the pen.

The wire over the windows is fastened to a frame hinged at the top to swing in. The inside boarding below the windows should be low enough so that the wire frame is 2 inches below the front of the top of the boarding outside of the window. This will admit a maximum amount of winter sunshine. If the window runs are so nailed that they can be removed and the windows taken out from the top, and the window sill and lower part of the window run are carefully painted, the inside boarding over the window run may be nailed in permanently.

Wire Over Windows and Ventilators—One-Inch Mesh—The wire over the front windows should be 1-inch mesh fastened to a frame hinged at the top to swing in. The frame should be of 1 in. x 2 in. material so placed that it will not shut out the sun. The wire over the slot ventilation may be inch-mesh or a six-inch strip of 1-3 in. of ½ in. mesh hardware cloth. The wire over the rear windows should be inch-mesh placed on frames that can be swung open to allow opening and closing the back windows.

Boarding—Novelty Siding—A good quality of thoroughly dry novelty siding should be used on the side walls. This should be carefully laid and painted at once to prevent checking. If the novelty siding is squared at the top in front of the windows and a 1 in. x 4 in. is nailed on the studding between the windows, no further finish is required for the front except the casing around the storm sash used as a door, hinged inside to swing in. Novelty siding makes a very good looking finish when painted, but it is not so warm as matched boards and paper unless the house is insulated.

Partition Boarding — The partitions should be tightly boarded to the ceiling. A section of the top of the partition between the middle post and the front wall may be constructed to open in summer for cross ventilation, but the partitions should be tight for proper winter ventilation.

Partition Doors — The partition doors between pens may be double doors 20 inches wide on double-action hinges if a carrier is to be used in the house, or they may be 40-inch single doors with one-way hinges and a latch. If double doors are used, the double-action hinges should be heavy enough to keep the doors from swinging with the wind. The doors should come down to within 6 inches of the floor. The remaining space should be filled by a movable board which can be taken out at the time of cleaning. The board is necessary to bring the bottom of the door above the litter. The door must be cut out at the top to accommodate the track, if a track and carrier are used.

A rear view of the Connecticut poultry house, showing the feed unloading platform for the top floor, on the poultry farm of David Cohen at Guilford, Conn.

Drop Boards—5 Feet Wide—The drop board should be 5 feet wide and run the entire length of the back of the building. It may be built to slide out 8 inches or may be built permanently 8 inches from the wall. The space behind the drop boards is a part of the air circulation system. The drop board section may be 7 ft. 10 in. long to correspond with the roost section. Drop boards should be 30 in. from the floor.

Roost Frames — The roost frames are built from three pieces of 1 in. x 6 in. x 5 ft. placed on edge across the drop board, and three pieces of 1 in. x 4 in. x 7 ft. 10 in. placed lengthwise on edge cut into the 1 in. x 6 in. make a frame 8 in. high. The 1 in. x 2 in. roosts are nailed across the top above the wire set 8 inches from each end and 13 inches apart to centers. These frames can be lifted and held up

An automatic no-waste water fountain using a float valve to regulate the flow of water. The tile pipe catches any spilled water and keeps the litter and floor dry around the fountain.

by a hook from the ceiling when the drop boards are cleaned. The frames are portable and can be easily taken out for painting with red mite paint.

The roost frames should be covered with 16-gauge 1½ in. mesh wire or square mesh welded wire 1 in. x 2 in., 14-gauge. The 1 in. x 2 in. roosts running from front to back hold the wire tight.

If roost pits are used to replace drop boards in the laying house plan, move the windows to the ceiling, increase the window size to 6-light 10 in. x 14 in. glass and place the pits against the rear wall.

Feed Room Construction—It is difficult to give details for feed room construction because each man's feed room requirements may differ. The door from the feed room into the first laying pen should be heavy and tightly built with strong, double-action hinges because this door must be kept tightly closed during cold weather. The feed room acts as a vestibule when entering the poultry house. If the room is in the upper story the floor should be strengthened by using an extra 2 in. x 8 in. carrying beam and placing the 2 in. x 6 in. floor joists a foot apart rather than two feet apart. The location of the outside feed room door and unloading platform may vary with the location of the poultry house relative to higher surrounding ground.

The best location for the feed room stairway may be determined by other activities or local conditions. In general the stairway is best located at the rear outside corner of the pen, with a landing half way up and short steps to each of the two floors.

Manure Chute and Pit — When a long house is equipped with a carrier for cleaning drop boards, a manure chute and pit is a worthwhile investment. The manure chute should be at least 5 feet square, allowing room for dumping a litter carrier, and the manure pit should be 10 ft. x 12 ft. or larger, depending on the size of the house and the frequency with which the pit will be cleaned. The manure pit should be open on one side and the chute should be ventilated at the top.

Gutters and Drain Pipes—Gutters and drain pipes are worth while on a poultry house, particularly with a double pitched roof construction where the drip from the front roof may be blown in or against the front windows. Either metal eaves troughs or wooden guters may be used. Wooden gutters should be put up in sections as long as possible. They must be built in at the time the house is constructed, they must be very carefully connected and painted and given sufficient pitch to carry off the water. Wooden gutters are very difficult and unsatisfactory to repair when not properly constructed. Metal gutters may be added at any time but had best be made a part of the new construction. If the house is long, several drain pipes to the ground may be needed.

Cold Weather Shelter

The Connecticut 6 by 10-foot cold weather shelter will house comfortably 120 pullets to maturity and is planned to give year 'round service. It will protect pullets in cold weather during early spring and late fall, will accommodate molting hens on range, and can be used for wintering extra breeding cockerels. The two ends are solid and panels in the back to provide a tight wall for cold weather can be removed to allow more ventilation in warm weather. The skids are high enough and the shelter is narrow enough to go anywhere a truck can go.

Skids—If lumber is purchased, 2 by 8-inch skids are advised. If pine or hard wood native timber is available in larger sizes, 2 by 10-inch, 3 by 10-inch or 4 by 10-inch skids may be used. Place a board 1 by 8 inches by 5 feet, 8 inches in length between the skids at each end to prevent drafts beneath the floor.

Floor Joists—Floor Joists are 2 by 4's, spaced 2½ feet apart. For durable construction, use 16-guage, 1½-inch mesh wire 5 feet wide. Set up skids, put on floor joists, and put 2 by 4's in between the ends of the floor joists. Then stretch wire tightly and nail securely with heavy staples.

Roosts — Use 1 by 2-inch roosts if material is purchased, 2 by 2's, if native white pine is available. Six 10-foot roosts, placed 11 inches apart at the centers, are required. Tip up the shelter to nail wire securely to the roosts.

Posts—Rear posts are 2 feet long, front posts are 3½ feet long. Corner posts are set flat against the end of the building with the plate cut in at the top. Center rear post and the two front posts on each side of the door are cut 4 inches shorter than the end posts and set flat against the front and back of the building.

Plates—Plates are 2 by 4's, 10 feet long, cut into the top of the post, and set on edge.

Rafters—Rafters are 2 by 4's, 8 feet long, spaced 2½ feet apart to correspond with floor joists, and to provide space between rafters to store rear wall panels when not in use. Place pieces of 2 by 4's in between rafters above rear plate. If galvanized roofing is used, set corner posts the other way than is recommended here. Front and rear plates should be lifted 4 inches and placed on top of the post. One rafter should be used at each end with a roof support running lengthwise between rafters through the center of the roof. Five pieces of 2 by 8-foot galvanized roofing will cover the building.

Roof Boards and Paper — Ordinary square edge boards or matched lumber may be used. Roofing paper recommended is 18-inch blind nailed paper.

Boarded Ends—Ends should be boarded up and down to provide strength of construction. A brace at each end, running from the lower front corner to upper rear corner, will give added strength. Since the roof has no overhang, it is advisable to cover ends of the shelter with paper. If ends are built of wide lumber, however, cleats covering cracks between boards may be used.

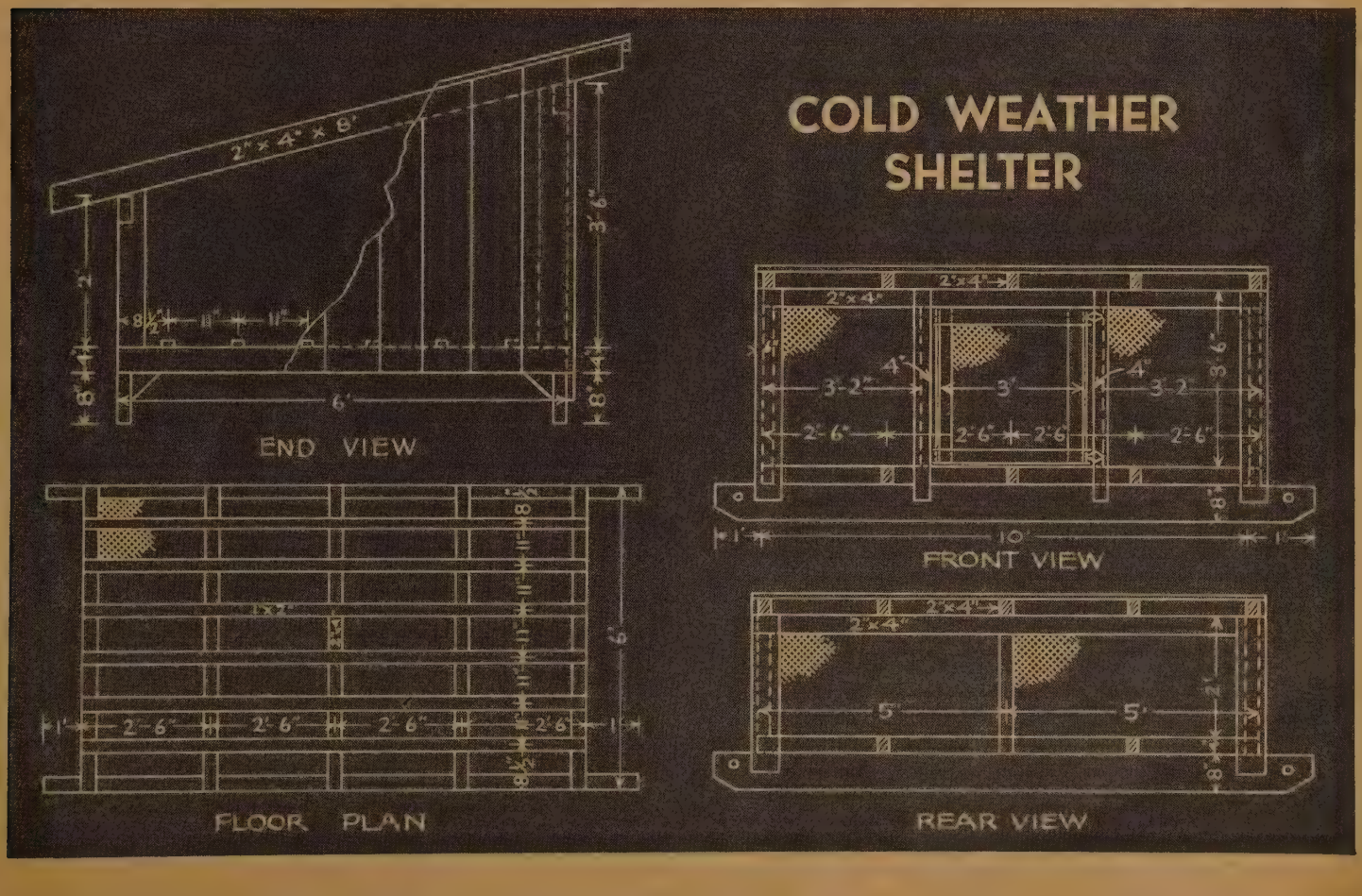
Panels in Rear Wall—Nail 1-inch mesh wire across the rear opening. A 1 by 6-inch board long enough to come halfway down the skid should be nailed at right angle to the skid on each end of the rear wall. This will help to hold the skid, the post and the plate together. Make two panels, each 2 feet by 4½ feet, to cover the remaining part of the rear opening. The cross piece on each end of each panel should be longer than the panel to fit over the board running up and down at each corner. Use buttons above and below panels to hold them in place. Panels may be taken out and slid in from the front between the rafters when not in use.

Front Wall—Front posts are 3 feet apart to accommodate a door 3 feet wide and 3 feet, 2 inches high. The door, built of 1 by 4-inch material, is hinged to swing sideways. The top half of the door can be hinged to a cleat across the door so that it will swing out and down. When this top half of the door is left open and the door is closed, the birds are protected from animals at night, yet they can fly out the upper half of the door early in the morning.

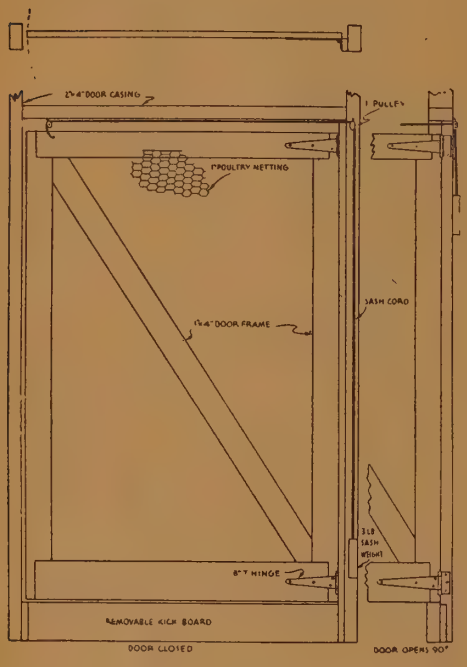
Studs on each side of the door should be placed with the 4-inch side to the front. Boards 1 by 6 inches, cut 3 feet, 10 inches long should be placed at right angles to the skid at each end of the front. Boards 1 by 4 inches, cut 3 feet, 10 inches long should be placed on each side of the door over the front post. Three-foot wire put on at right angles to the skids can be nailed to the plate at the top, the floor joists at the bottom and on the inside of the boards running at right angles to the skids. Burlap can be nailed over the open space in the front during cold weather. Ventilation will be provided through the spaces between rafters over the front plate.

If the shelter is used for wintering extra breeding cockerels, two 6-light, 10 by 16-inch barn sash can be placed in each end of the front. With a 1-inch sill at the bottom, the sash will just fill this space.

It is recommended that a wood preservative be applied to the skids, floor, side walls and all exposed woodwork.



Double-Swing Partition Doors



There are a number of ways of hanging double-swing doors, but about as satisfactory and inexpensive a method is shown in the drawing.

Two "T" hinges, about 8 inches in size, are attached to a light door made of 1 by 4-inch material and covered with 1 or 2-inch poultry netting. A piece 2 inches wide and the same thickness as the door is nailed to the door casing.

To the 2-inch face of the strip, and on the inside of the casing, the base of the hinge is fastened so the door is offset the thickness of the door from the casing. This will allow the door to open 90 degrees in either direction, giving full opening for passage of caretaker.

To make it self-closing a hole is drilled in the upper corner opposite the hinge side large enough to allow a heavy sash cord to pass through the door. About a 1-inch pulley is hooked into a screw eye directly above the hole in the door when the door is in a closed position. On the 2 by 4-inch studding on the hinge side of the door, and on the same level as the first pulley, a similar pulley is fastened to a screw eye.

Door Closes Automatically

A piece of sash cord a little more than twice the width of the door is run through the hole in the door and a knot tied in the end to keep it from pulling through. The other end is threaded through the pulley over the door and across the top of the door through the other pulley and a 3-pound sash weight tied to the end and allowed to hang along the stud. When the door is pushed open in either direction the sash weight pulls the door closed by tending to pull the upper corner to the closest pulley.

Beneath each partition door is placed a kick board 6 to 8 inches high to clear the door of the litter. The door with this arrangement allows the caretaker to go through the doorway with hands full by pushing with foot or other part of body without first emptying one hand.

10x12 Insulated Brooder House

Poultry raisers who have had any experience with insulation in the construction of laying houses know that insulation pays for itself quickly by preventing the loss of egg production during sudden cold spells.

In brooder house construction, insulation is valuable in preventing sudden fluctuations in temperature, which so often lead to chilling, and in reducing fuel costs. One inch of a fibrous insulation board is equal in insulating value to over 2 inches of softwood and 3 inches of hardwood.

The blue print plants on the opposite page are for a 10 by 12-foot brooder house, which is a very popular size house. It will accommodate between 250 and 300 chicks, which is the proper size brood to have around one stove. Larger size broods frequently lead to trouble in brooding.

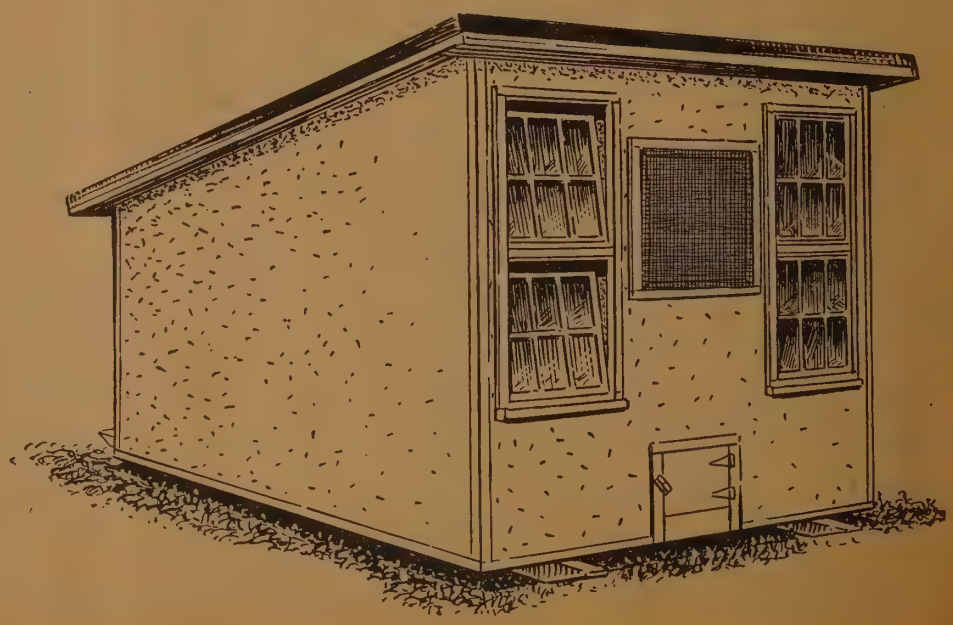
The plans as presented here require very little explanation. All details in the framing are indicated plainly. It will be observed that the 2 by 4 studs on the sides are spaced 24 inches on center. Some manufacturers recommend this spacing of the studs, while others advise 16 inches on center. If the 16-inch spacing is used, it will require two additional studs on the one side and three on the other. The main thing is to have a stud every 4 feet, for most of the rigid insulation boards come in the 4-foot width, although at least one manufacturer offers it in widths up to 8 feet.

The poultryman who is able to obtain used sash may find it necessary to change the size of the openings at the front of the house, and this can easily be done by changing the front framing accordingly.

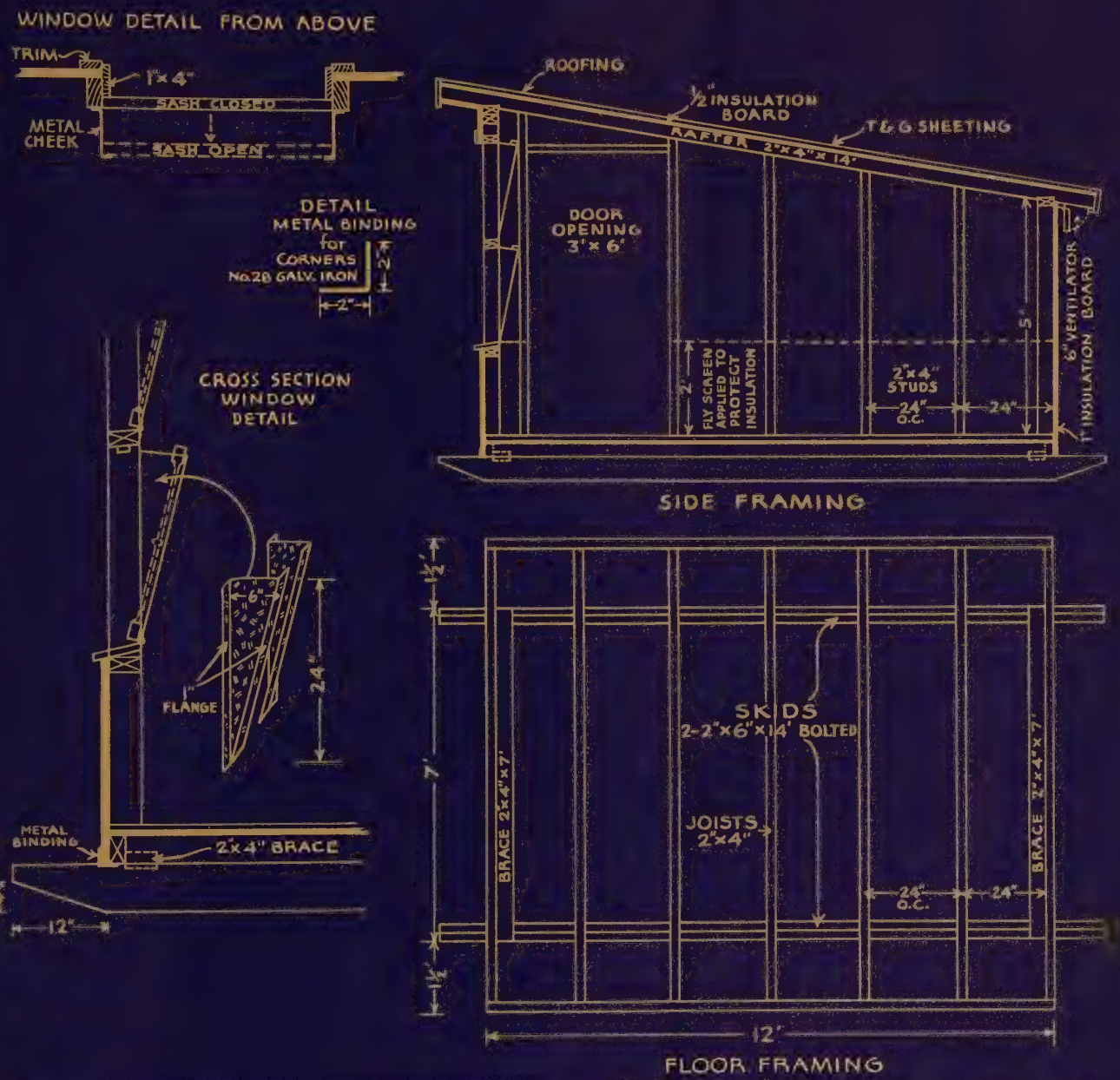
Insulation board of one-inch thickness is specified for the side walls, while one-half inch thickness is recommended under the wood flooring and under the wood sheathing on the roof. This will result in tight construction, and proper ventilation should be possible through the regulation of the windows. The ventilator opening underneath the eaves at the back of the house is intended for use later in the season when more circulation of air through the house is desirable.

So as to give the house a neat appearance, metal binding is recommended for the corners as well as for the lower edge of the insulation board on all four sides. These are the points where the insulation is most easily damaged.

Galvanized metal strips 2 inches wide should be used as batten strips wherever two pieces of insulation board meet on the studs.



10'×12' INSULATED BROODER HOUSE



THE NEW JERSEY 10 x 12 House

Use It for Chicks, Growing Pullets, or the Layers

By Willard C. Thompson

IN these days of economies it is desirable to find plans for poultry buildings which will serve more than one purpose, if possible, in order to further insure a year 'round use for them. The spring season lies just ahead, and with it comes the centering of attention on the chick flocks.

On many a plant this spring, better facilities will have to be provided in order to be able to do an efficient job of chick rearing. In some places new brooder houses must be purchased or built. Here is a suggestion! It is possible to build a small poultry house which will furnish an ideal place in which to house a unit of chicks under optimum conditions, and which will, later in the season, become an ideal summer colony house for growing pullets, and, still later in the year, become an ideal winter home for laying or breeding flocks. This house will be in use 365 days of the year, if properly managed. It will not waste time, unless the poultryman fails to do his part.

In the first place, the size of it is of fundamental significance. It is 10 feet wide and 12 feet deep, providing, thus, 120 square feet of floor space. This means that it is large enough to adequately provide space for from 250 to 300 baby chicks until approximately 6 weeks of age. This is as many chicks as should be placed in one unit flock, and under one brooder stove. It is a splendid and efficient working unit for colony brooding. The 12-foot depth allows one to place the brooder stove a little back of center, which is desirable.

The same 120 sq. ft. of floor space provide space enough for from 100 to 125 growing pullets, that is from six weeks to egg laying maturity. Again, the same floor space proves to be ample for a flock of layers or breeding hens of from 25 to 35 individuals.

In the second place, it is so planned that one may put a temporary partition across it, from front to back, in the center, and make two pens for an individual cock, or

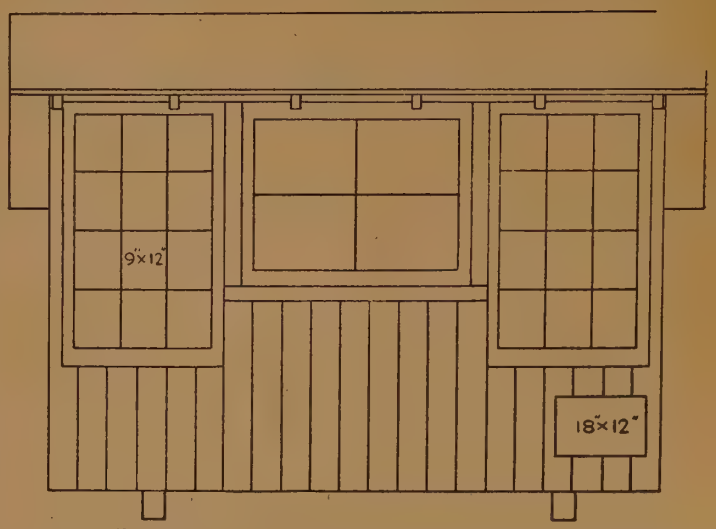


FIG. 1 — Front view of the New Jersey 10 by 12 poultry house. Side windows hinge inward. Middle window slides down.

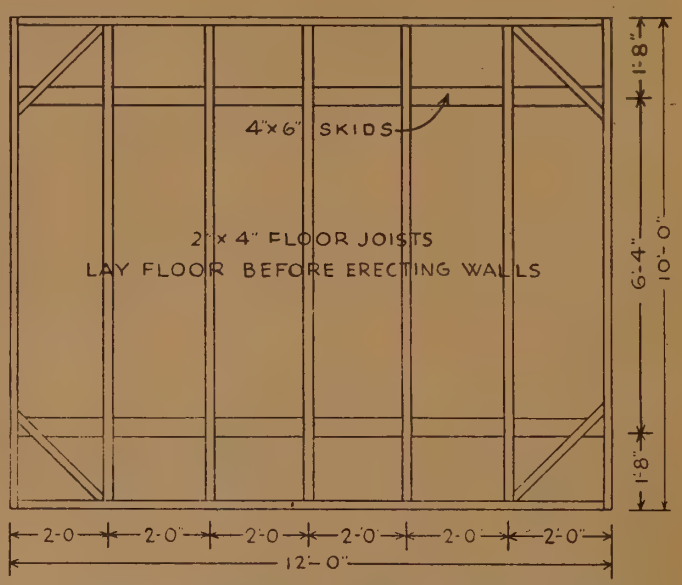


FIG. 2—Construction details of the floor framing.

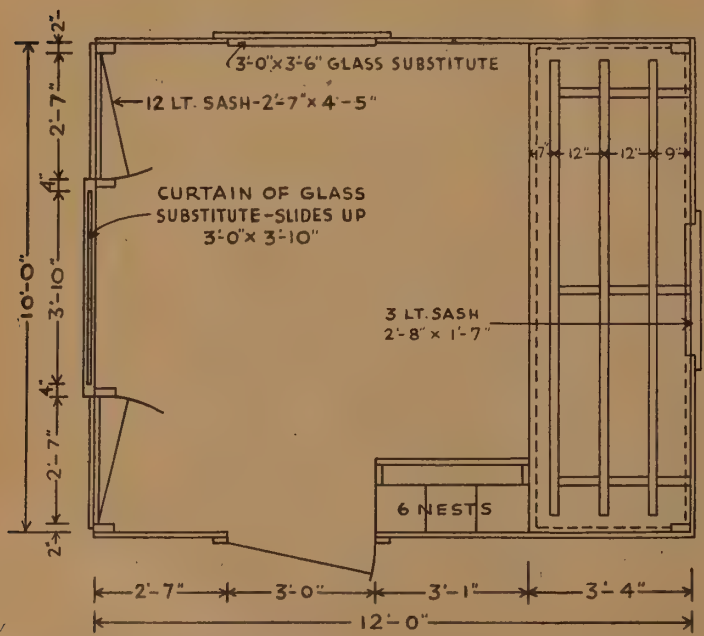


FIG. 4—Floor plan of the New Jersey house. Roosts and nests will be omitted when house is used for brooding.

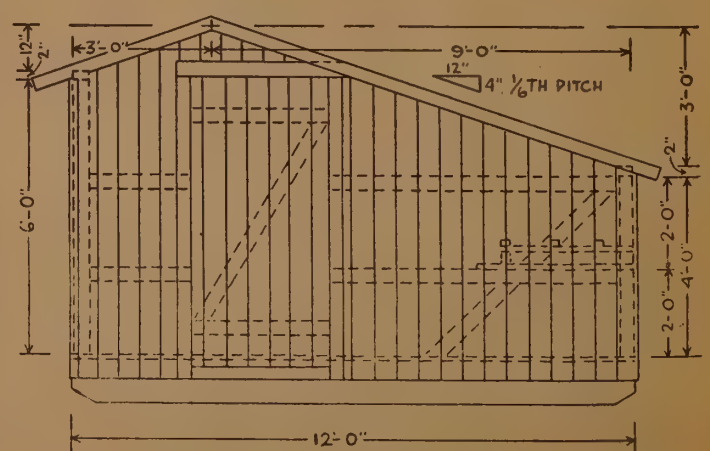


FIG. 3—Side view showing framing, roosts and droppings boards. Insulation board can be used for the siding.

cockerel, with hen breeders. Thus, it can cheaply and quickly become a double-pen breeding house during the winter and early spring months.

Permits Good Lighting

Thirdly, the windows, in both front and rear wall make possible a maximum amount of direct sun-light, and even uniform lighting of the interior of the house, a good point, whichever use is being made of the house. The front curtains may be lowered or raised at will, depending upon the weather. The side windows hinge to open at sides.

Fourthly, the open front is adequate solution of the ventilation. In summer the rear wall window may be taken out, or hooked open, to create a cooling draft through the house. In winter time, the house is tight and draft proof, and no floor drafts to disturb chicks are possible.

Fifthly, the nests, perches, and droppings boards are easily movable, and are not put in during the spring when chicks are being cared for. The widest possible option is suggested as to fixtures. Splendid ones made of galvanized metal and purchased on the market fit.

Insulation Excellent for Siding

If one desires, this building may be doubly protected both against the cold of winter and equally against the heat of summer by using a high grade insulating material. We have built two houses thus by placing an insulating board next to the studs on the frame before putting on the outside wall boards. This works easily and fine.

In another house we lined the interior with the insulating board, making a desirable smooth interior by nailing the insulating boards to the inner side of the wall studs. In still another variation of this building, we have used insulating board as a side wall material, and have used no lumber siding with it. All three types of construction work well.

One may vary the construction considerably and still stay within the fundamentals of the plan. Start building with the laying of the skids, then the floor joists, and the floor itself. Next the four corner posts, the plates, and the end rafters. Then the siding is put in place and the building becomes rigid.

Bill of Material

It is difficult to make an exact bill of material, as workmen differ in their methods. The house may be built of the following:

2—4 in. x 6 in. x 12 ft.
Yellow pine—skids
14—2 in. x 4 in. x 10 ft.
Fir—studs, plates, joist
2—2 in. x 4 in. x 12 ft. Fir—headers
6—2 in. x 4 in. x 14 ft. Fir—rafters
4—2 in. x 2 in. x 10 ft. Fir—roosts
32—1 in. x 6 in. x 12 ft.
T. & G. spruce — flooring, dropping boards
26—1 in. x 8 in. x 12 ft.
Yellow pine—roofers
44—1 in. x 6 in. x 14 ft.
T. & G. beaded white pine—siding
2—1 in. x 12 in. x 10 ft. White pine—nests
2—1⅛ in. x 2 in. x 12 ft.
White pine—trim, middle front window
14—1 in. x 4 in. x 12 ft. White pine—trim
8—1 in. x 3 in. x 12 ft. White pine—trim
4—1 in. x 2 in. x 12 ft. White pine—trim
2—Rolls prepared roofing
2—1⅛ in. x 2 ft. 7 in. x 4 ft. 7 in.
12 light, white pine sash
1—1⅛ in. x 2 ft. 8 in. x 1 ft. 5 in.
3 light white pine cellar sash
Nails: 4 lb. 20 d common
4 lb. 10 d common
10 lb. 8 d common
15 lb. 6 d common
1 thumb latch
6—6 in. heavy tee hinges
1 sash pulley
1 sash weight

Protect Against Wood Decay

These houses are readily moved about the plant, a sanitary feature of no small value. They should be preserved against decay and weathering. We have found an economical method to be the spraying of both interior and exterior with a carbolineum or other good wood preservative, put on quickly with a spray pump. It soon dries, and presents a neat and attractive appearance. It is well preserved.

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5 x 10 Shed-Roof Shelter

This 5 by 10-foot shed-roof shelter, designed by engineers of the University of New Hampshire, has a capacity of 75 birds. Being light in weight, it is easily moved. It should be located with the front or high side away from the direction of the prevailing winds. Note that the shelter can be lifted from the platform.

Bill of Material

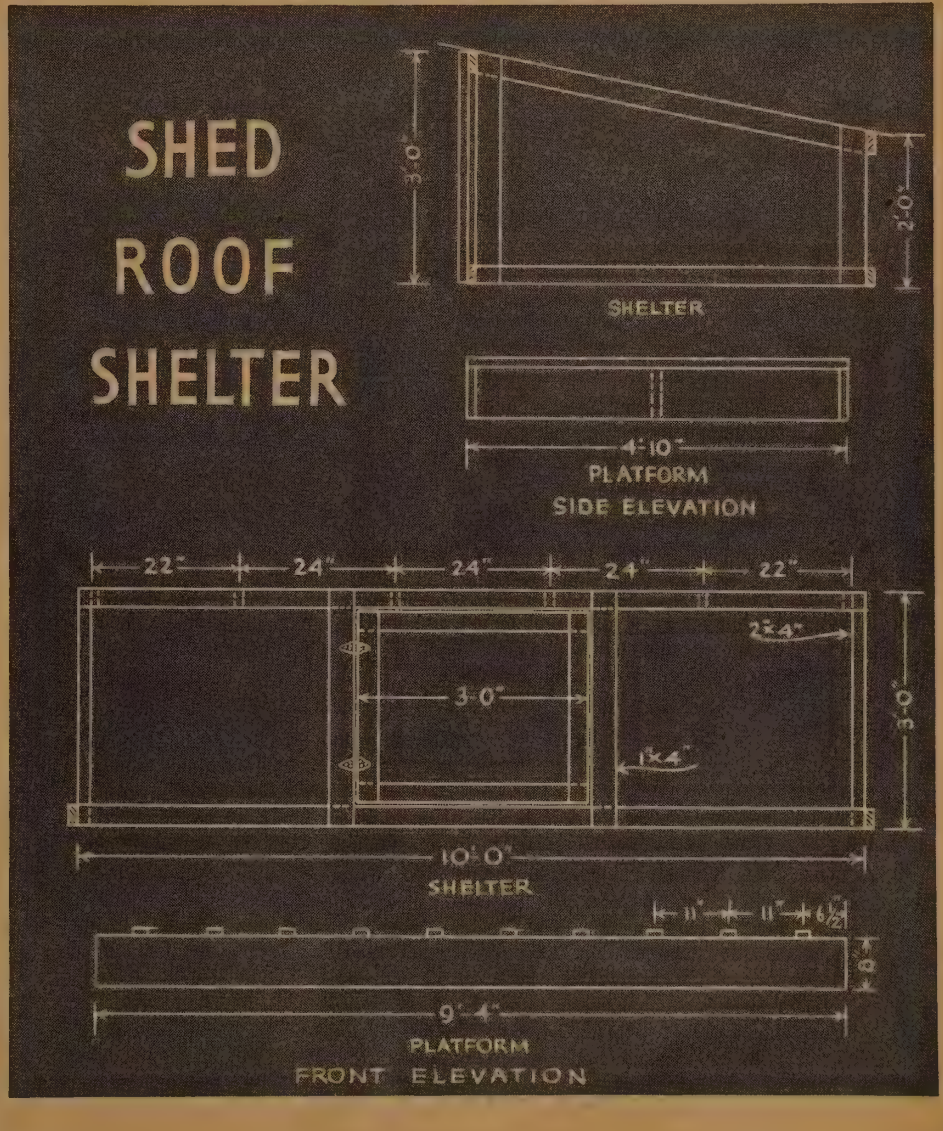
Studding	2	2 in. x 4 in. x 3 ft.
	2	2 in. x 4 in. x 2 ft.
	2	1 in. x 4 in. x 2 ft.
	2	1 in. x 4 in. x 3 ft.
Sills	2	1 in. x 3 in. x 10 ft.
	2	1 in. x 3 in. x 5 ft.
Plate	2	1 in. x 3 in. x 10 ft.
Rafters	6	1 in. x 3 in. x 5 ft. 3 in.
Door	2	1 in. x 3 in. x 3 ft.
	2	1 in. x 3 in. x 2 ft. 6 in.
Roosts	10	1 in. x 2 in. x 4 ft. 10 in.
Base	2	1 in. x 8 in. x 9 ft. 4 in.
	1	1 in. x 8 in. x 9 ft. 2 in.
	2	1 in. x 8 in. x 4 ft. 8 in.

Wire for Base—1 by 2-inch mesh welded, or, 1½-inch mesh, 16 gauge, 10 feet long, 60 inches high.

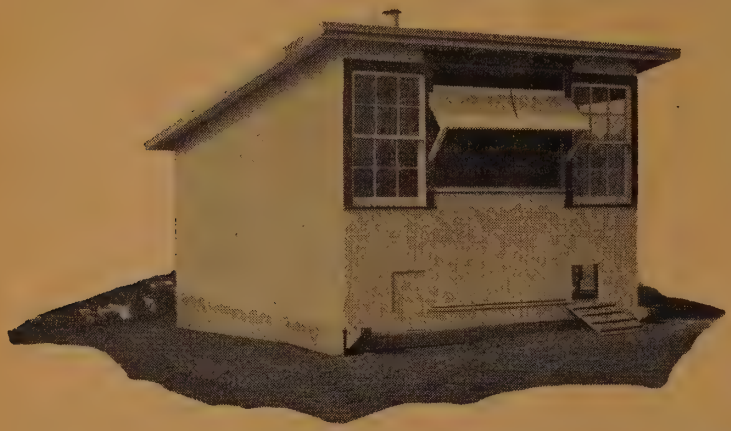
Wire for Sides—Poultry netting, 15 feet long, 60 inches high.

Roof—Galvanized sheeting or paper.

Nails, staples and hinges.



10 x 16 Brooder House



The completed brooder house.

This 10 by 16-foot brooder house, used on Leader Farms, York County, Pa., is ideally suited for brooding chicks in groups of 300 to 350. It has enough depth that the brooder stove can be placed in such a position to follow the warm and cool principle of brooding. Because of the light framing necessary with this type of construction, it is economical in cost.

Skids and Floor

The skids are 4 by 8-inch lumber 18 feet long. There are nine floor joists of 2 by 8-inch lumber 10 feet long. The method by which the joists are fastened to the skids is shown in the photograph below and also in the diagram on the opposite page. The 1 by 2-inch fir flooring gives the foundation sufficient strength that no additional bracing is needed.

Framework

With the exception of a 4 by 4 roof support through the middle of the house as shown in the side view, all other framing is 2 by 4-inch material.

Roof

The rafters are 2 by 4-inch lumber spaced 24 inches apart on center. Tongue and groove flooring, 1 by 5-inch material, is applied to the rafters. Roll roofing with the laps cemented makes a watertight roof. The detail drawings show the construction of the eaves and the "double-drip" feature which prevents the water from dripping along the rafters and running into the house. The roofing extends down a quarter inch below the 1 by 2 extra face board.

Siding

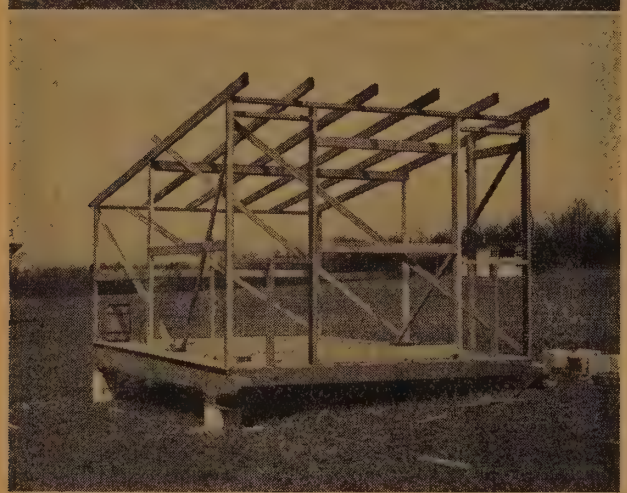
The tongue and groove siding is applied vertically, adding strength to the structure.

Windows

The windows are six light, 8 by 10 sash, sliding up and down. The window trim is 1 by 4-inch material above, and 1 by 3-inch at the sides.

Ventilation

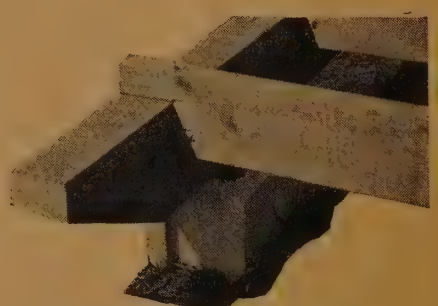
The large opening in the front of the house is the principal means of ventilating the house. This opening is covered with one-half inch mesh hardware cloth. In cold weather, this opening is closed with a glass substitute



Top: The skids and floor joists ready to receive the flooring.

Middle: The framework of the house. The long braces are removed after the siding has been applied.

Bottom: Here the house is practically completed, except for the hood over the large central opening.



This closeup shows how the floor joists are fastened to the 4 by 8-inch skids. After the flooring is applied, there is sufficient bracing that there is no danger of the framing twisting.

View of rear ventilator.

window. Directly above this large opening is another ventilator which is 10 inches deep and 56 inches wide. The ventilator is hinged so that it can be opened or closed in accordance with weather conditions.

Ventilation from the rear of the house is regulated by opening or closing a ventilator just under the eave.

Hood Keeps Out Rain

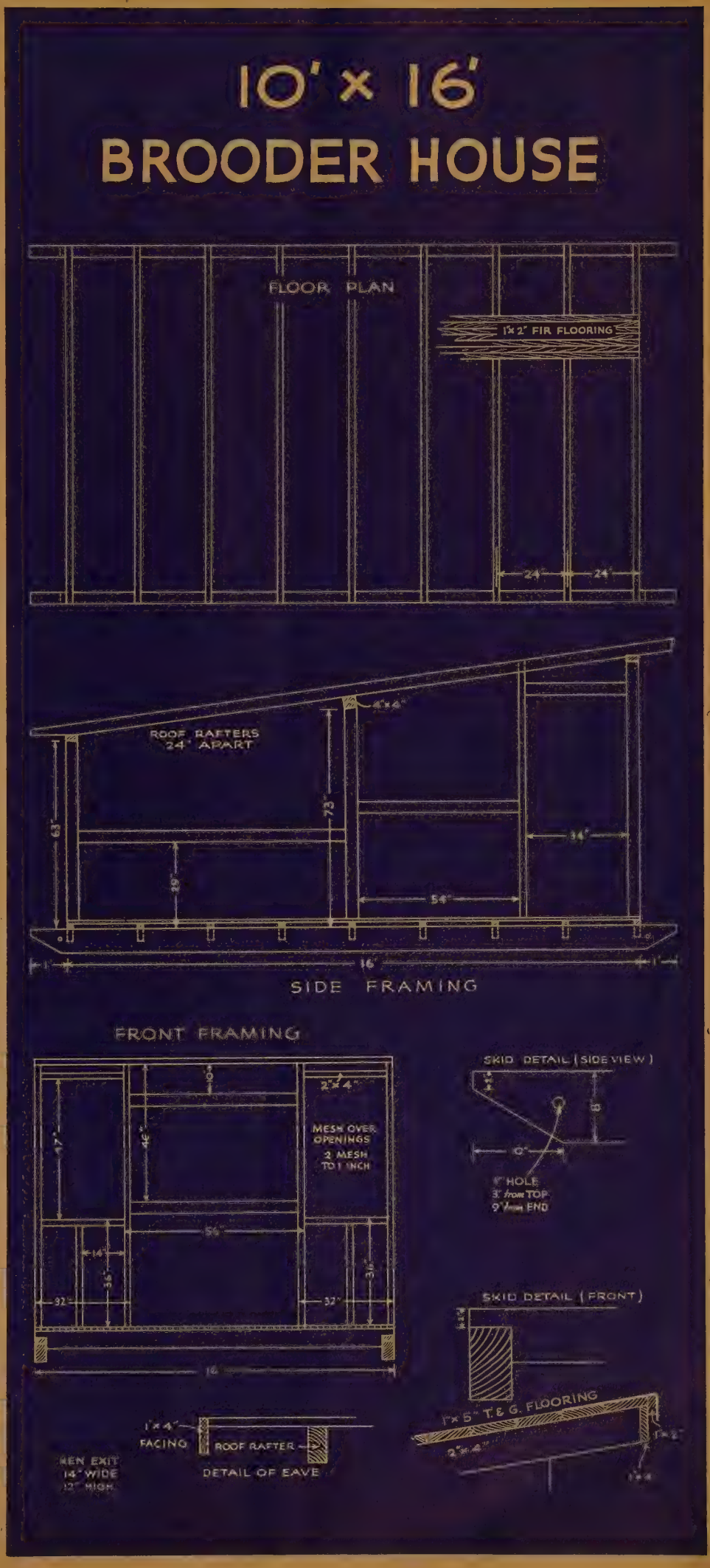
The hood over the large opening at the front keeps out driving rains. It can be raised or lowered. See the plans for the 22 by 22 laying house on page 9 for the details on the construction of this hood.

Curing Concrete

The curing of concrete is a chemical process depending on the presence of moisture for satisfactory completion. Too frequently, concrete construction during hot dry weather suffers from too rapid drying out with resultant weakening or failure of the structure. Concrete must be kept moist to attain its maximum strength. Under ordinary circumstances the treatment should continue for about the first seven days after placement. The work may be covered with burlap bags kept wet or with sawdust or with earth. Large flat surfaces may be sprinkled with calcium chloride which serves to draw moisture from the air and keep the surface damp.—W. C. Krueger, N. J. College of Agriculture.

Protecting Metal Roofs

Galvanized iron roofs and sheathing which show signs of rust by pitting may be conditioned by the use of metallic zinc paint. Although expensive, such paint has good coverage qualities and bonds ideally with the galvanizing surface of the sheathing. This type of paint has the advantage of building up the surface already existent, and maintains the original color and texture. Other forms of treatment include the frequent use of fish oil, painting with aluminum-asphalt paint, or the use of ordinary outside oil base paints.—W. C. Krueger, N. J. College of Agriculture.



Plans for Floorless Brooder House

Low cost housing if you need additional brooding capacity.

By H. H. KAUFFMAN

FLOORLESS brooder houses have been used by some Pennsylvania poultry growers during the past four years and they are still in the experimental stage, especially in their construction and design. Since there are no floor joists and flooring to give bracing strength at the base of the house, the bracing strength must be built into the roof. For that reason, these houses are usually designed with low sides and the rafters firmly

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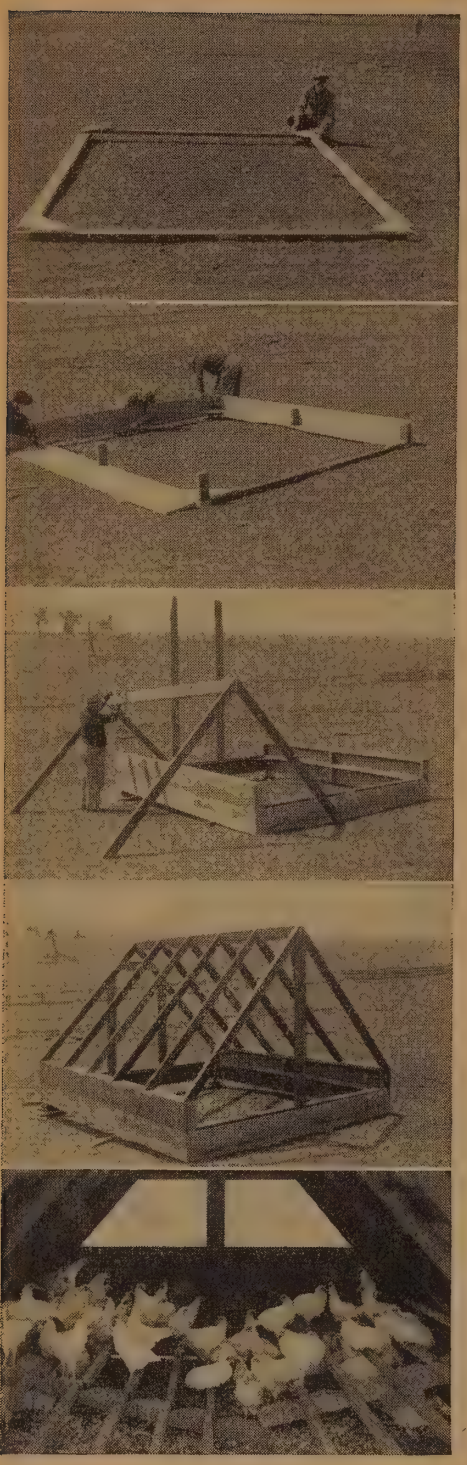
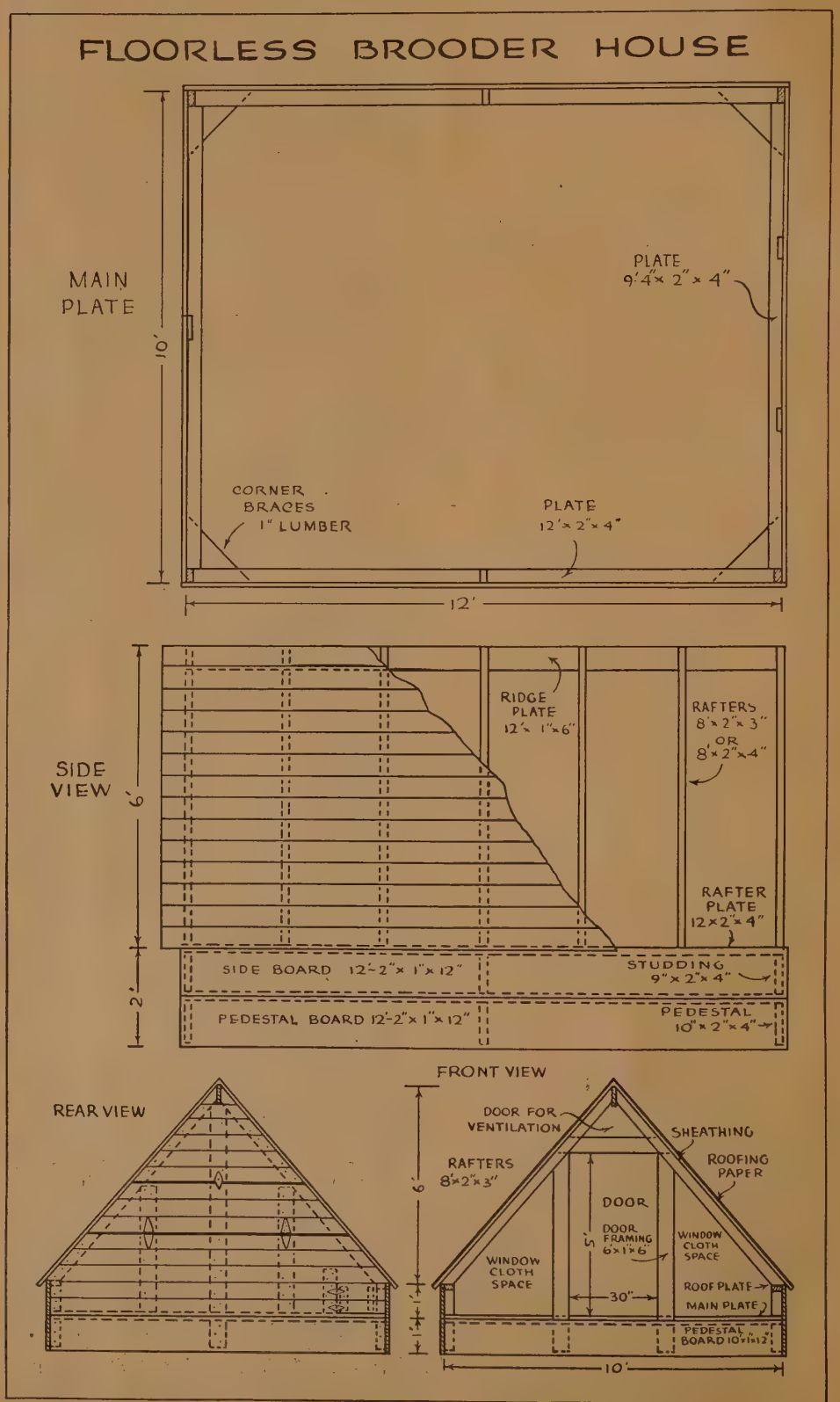


Photos, from top to bottom: 1. Squaring up the main plate. 2. Putting on pedestals. The 2 by 4's are 1 inch short of coming to the bottom—to permit fitting a floor underneath at a later date. After completion, this is turned over. 3. Side studs and boards are placed, and location of rafters is being marked on the ridge pole before it is set in place. 4. Completed framework. Sheathing is applied to roof and back. Wire netting is put over front end and door, then covered with glass substitute. 5. Inside view showing glass substitute over window opening. Roosts can be swung upward out of way when stove is in use. (Pa. State College Photos)



6 by 8 Backyard Poultry House

By G. T. KLEIN
Massachusetts State College

BACKYARD poultry keeping is now showing the greatest growth of any period since World War days. This growth is not ill advised, for small poultry flocks will produce eggs and poultry for much less than the market price. Under strict rationing, the backyard flock may be a most important source of family food. The Nation also looks to the backyard flocks as quite essential in meeting the poultry and egg goals of 1943 and the remaining years of the war. They are truly Victory Flocks.

Practically all new ventures in backyard poultry keeping must be accompanied by some sort of a building program. It may be a part of the garage that can be converted for the duration. It may be some little used tool shed, or it may have to be a building specially constructed for the flock.

Massachusetts State College now offers plans for a small Victory Poultry House. It is 6 by 8 feet providing enough space for a dozen hens. It cannot be represented as a cheap house, because there is no cheap construction these days. There are many corners that can be cut which will cheapen the house from the way it is designed and keep it more in line with a true victory production program. The house should be substantially, but not extravagently built.

How to Keep Cost Down

The plan shows a wooden floor, but this can be omitted keeping the layers on a dirt, sand or cinder fill. Some might prefer to use concrete for greater sanitation and rat proofing, though it is more expensive. Lumber used on the sides is vertical tongue and groove sheathing which gives a rather tight wall if painted quickly. Rough native boards or second-hand lumber could be used greatly reducing the cost. If this construction does not give tight walls, the boards can be covered with building or roofing paper.

The plan shows a shed roof which is the simplest to build. If for appearances, a two-thirds span or a gable roof is preferred, the house could be easily changed in this respect. The 2 by 3-inch material specified in various places could be increased to 2 by 4-inch material for greater structural strength.

Nests Opened from Outside

A convenient feature of the house is the hinged board on the outside wall which opens into the nests. These nests are about the size of orange crates and could very satisfactorily be replaced with orange or with egg crates if the latter were not so scarce at present.

Another very special feature is the

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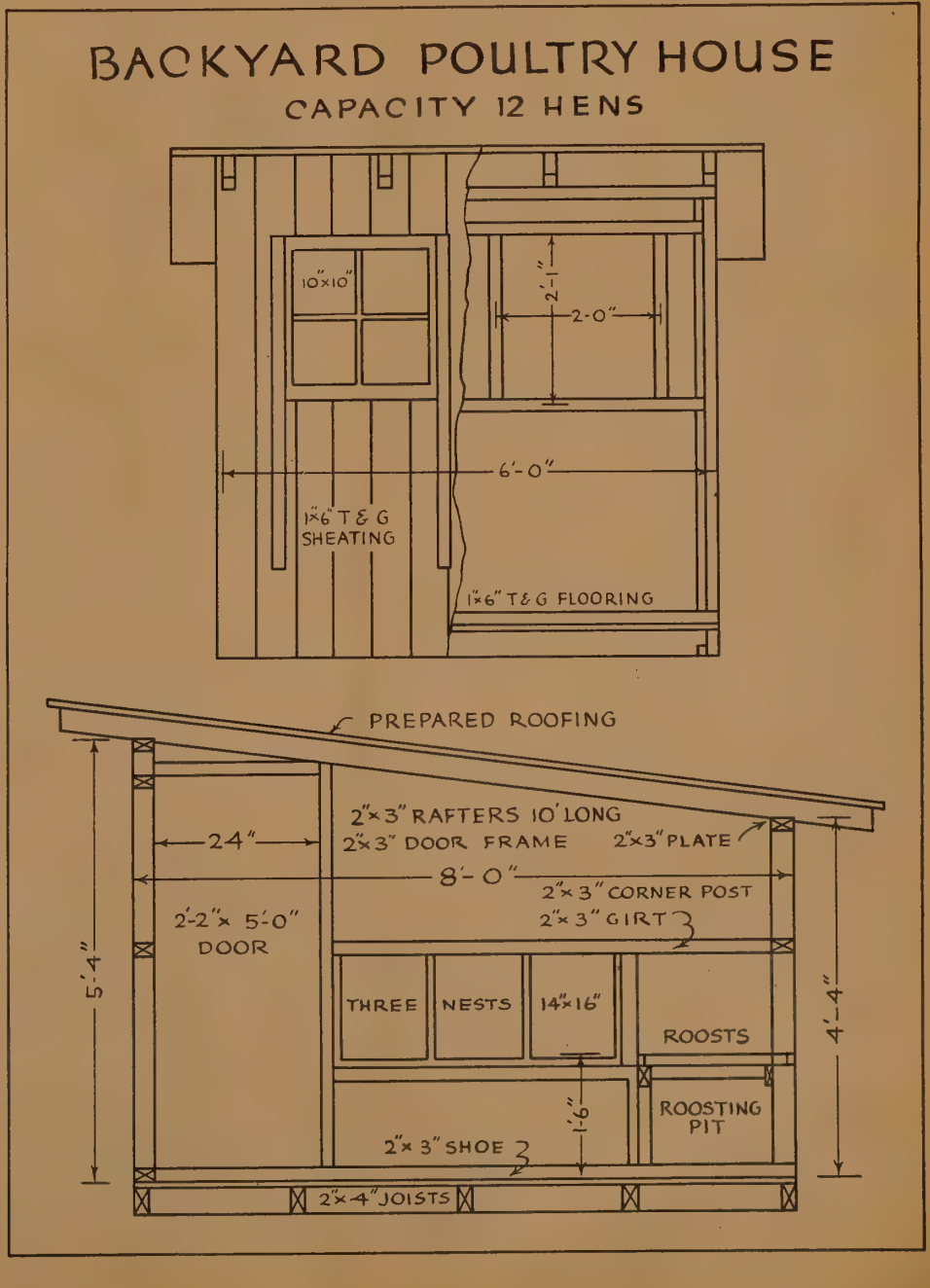
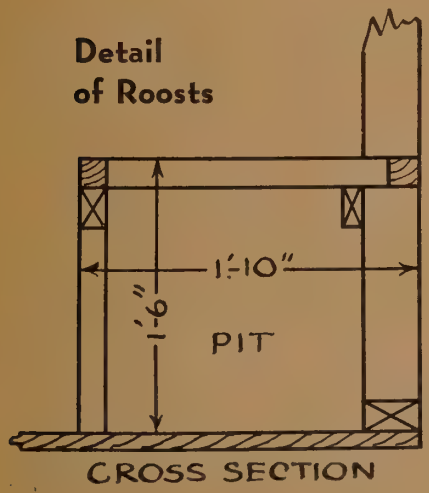
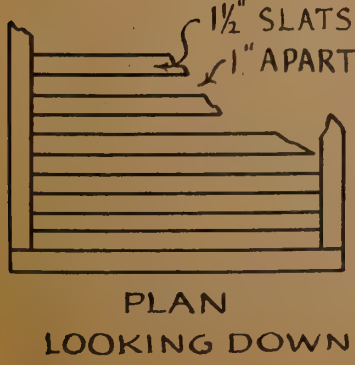






The New Jersey 20x20 Shed-Roof Laying House

By W. C. Krueger

EVERY poultryman sometime or other, has made decisions regarding the construction of poultry houses or equipment; and most poultrymen have quite definite ideas on what they consider the best type of construction. Complete agreement cannot be expected where so many variables are offered, but geographic sections do develop a type of house characteristic of that area, and embodying those features which by custom, trial, development and study have proven satisfactory for the average producer.

Such a house is the one widely known as the New Jersey 20 by 20 foot Shed Roof Poultry House. It represents many years of development, the combined suggestions of poultrymen and college specialists; many changes and trials in one of the most poultry-conscious areas in the United States.

Holds 100 to 125 Birds

The house is planned to accommodate from 100 to 125 birds, is designed to be used as a separate unit or a part of a multiple-unit "long house." It is 20 feet square. Although there is at present a growing tendency to build deeper houses, there is still a decided demand for the 20 foot depth. This span is nearly the limit for shed roof construction. Preferred by many to the broken span roof house, it is simpler and lower in cost. The necessity for better roofing on the flatter shed roofs is compensated for by the elimination of a separate ceiling structure so commonly applied in broken span houses.

The choice between wood or concrete floors will probably remain one for individual decision, so both types of construction are offered in the plans. On well drained soils, where the land is level, concrete floors are common, and have given entire satisfaction. Where slopes necessitate "stepping" the houses, and where poor drainage favors dampness in soil-contact floors, wood construction is preferred. Dampness, sometimes associated with concrete floors, is condensation from the air, rarely the outcropping of ground moisture. Dampness, however, tends to favor heat conduction, the damp concrete floor becomes colder than the room air and condensation results. Concrete floors should be laid over well drained soil, with a layer of cinders between dirt and concrete. A dense, hard troweled finish is easiest to keep clean.

Foundation Walls

Construction of the house follows standard practice. The 8-inch foundation walls extend 1 foot below grade, can be poured concrete or blocks. The single, central 2 by 6-inch girder supporting the joist runs the width of the buildings, and is set flush with the top of the foundation. Over this go the 2 by 4-inch joist, spaced 2 feet on centers, the two along the front and back walls set flush with the outside line. These are spiked to short lengths of 2 by 4's bolted flat to the wall top at 4 to 6-foot intervals.

Over these joists is diagonally laid the sub-floor, covered with building paper. A 2 by 4-inch sill, laid flat, is next placed around the floor edge and the studs spiked in place. Back studs are 5 feet 2 inches, front, 8 feet 4 inches. The plate over the back stud is one 2 by 4 inches; two 2 by 4's are used over the front studs. The 22-foot rafters are now set in place, overhanging the back 1 foot 9 inches. The front extension is framed of a 2-foot lookout nailed to each rafter. Some prefer to use 24-foot rafters, having the front overhang continuous with the roof, claiming that the rain protection afforded by the broken front is of small value. The rafters are supported at their center by a purlin of two 2 by 6's. A post made up of two 2 by 4's set on a 16 by 16-inch concrete footing in the center of the floor supports the purlin.

When only a single unit of the house is constructed, two, nine light, 8 by 10-inch light windows are set in the side walls. In multiple unit houses, doors replace these windows to provide a passage way from unit to unit throughout the house. Each unit has a 3 by 6-foot door in the center front and two windows, each three 9 by 16-inch light, at the rear under the dropping board level. These are for illumination at the rear of the house and have proved very helpful in providing ventilation during extremely hot weather. They are usually hinged at the top swinging outward and may be replaced with screens for summer use.

Glass Substitute or Muslin Windows

There is always a lot of controversy about the type of construction for poultry windows. Some authorities hold that the tendency is for too much light and that we should cut down on the window area to discourage cannibalism and to lower heat losses. Many poultrymen feel that a large area exposed to sunlight will benefit the birds by reason of the ultra-violet effect, forgetting that the rays will not penetrate a film of dust and therefore lose their effectiveness when light passes through dusty glass, glass substitute or muslin.

The material used for windows is therefore a matter of individual choice. The New Jersey plan shows muslin or glass substitute, mainly because the framing for this is less expensive, also the material. The amount of air exchange through muslin, especially after it becomes dusty is of little value from the standpoint of ventilation.

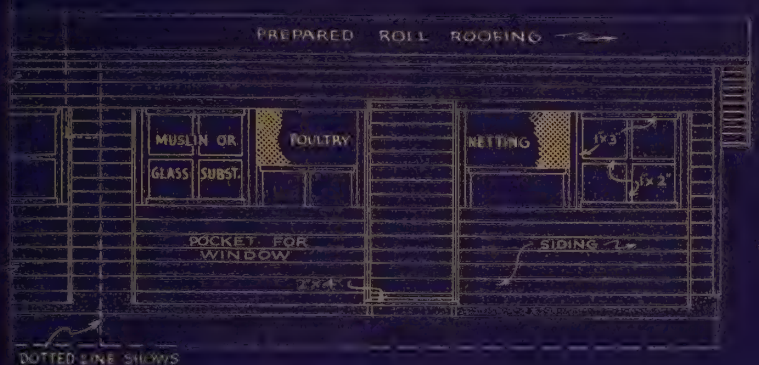
The New Jersey house has four windows at the front, two on each side of the door. Each window has approximately eleven square feet of area. Windows are balanced with sash cords and slide up and down in runways into a pocket made of sheathing against the outside of the house. This protects the windows when they are open.

Built-Up Roof Recommended

Poultrymen have found rolled roofing on the flat shed roof house types not entirely satisfactory. A poor quality of roofing has admittedly been used in many cases, but flat roofs favor blow-ins, seam leaks and more rapid failure. Although roll roofing is suggested in the plans as being the least expensive in initial cost, quite a

NEW JERSEY 20′ × 20′ MULTIPLE UNIT LAYING HOUSE

SECTION (CONCRETE FLOOR)

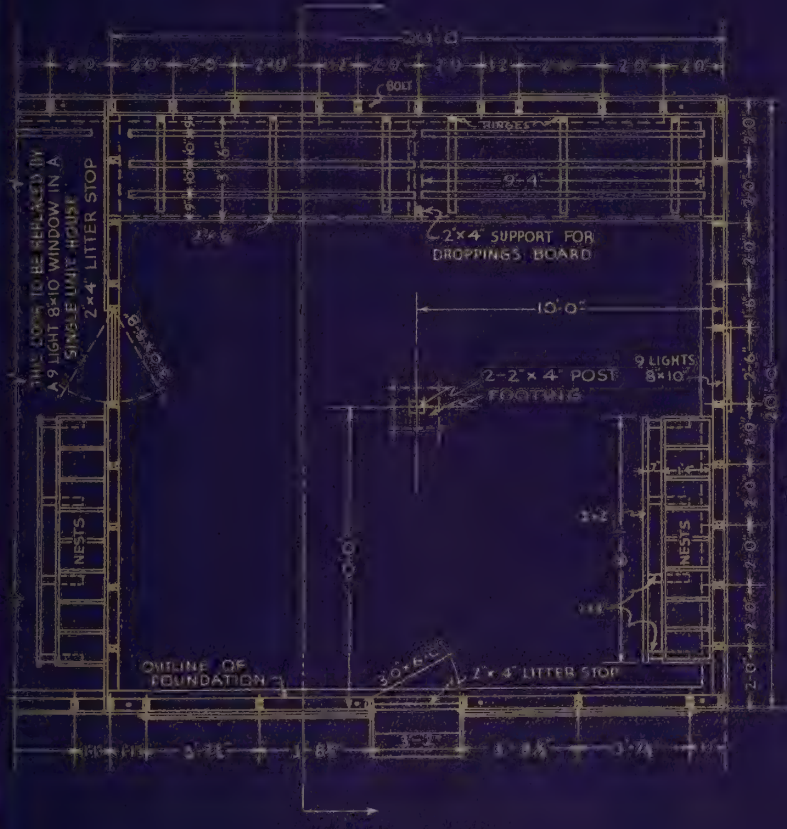


FRONT ELEVATION

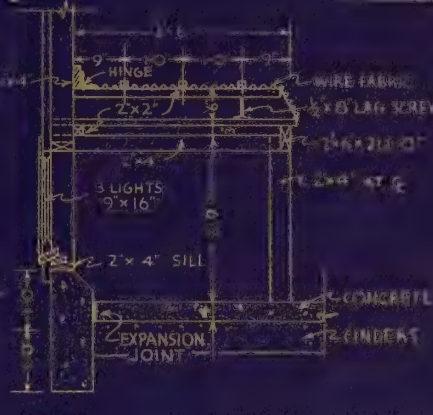
SECTION (WOOD FLOOR)

NOTE: STUDDINGS ARE CUT 6" LONGER FOR WOOD FLOOR CONSTRUCTION

PLAN OF FRONT WINDOW



FLOOR PLAN



DETAIL OF DROPPINGS BOARD

few poultrymen prefer to spend a little more at the outset and have fewer replacements and lower up-keep costs. These men are using corrugated galvanized iron roofing or built-up roofs of alternate layers of roofers' felt and asphalt. At least 15 to 20 years of life can be expected from these types of roofing with proper maintenance.

Because of their heat reflective value, galvanized iron roofs have resulted in cooler houses during hot weather. This seems to hold true, however, only when laid over a solid deck. Building paper is recommended between the deck and the corrugated roofing.

Ceiling Insulation Advised

Insulation in open-front type houses is of questionable value according to records obtained at the experiment stations, both here and elsewhere. There is general agreement, however, on the necessity for ceiling insulation as a protection against excessive heating in the house in summer and undue radiation and ceiling condensation in winter. This holds for both shed roof and broken span type houses.

Roost Arrangement

The arrangement of roosts and the disposition of droppings offers several variations in treatment. After trying out movable table type roost benches, roosts along the side walls and through the center of the house, it was decided that the best all-around solution was placing the roosts across the back of the house, three roosts deep, hinged at the back for removal of the dropping from the dropping boards placed 6 inches below the roost support level. Although poultry netting is commonly used for a covering under the roost poles, wire fabric is considered superior and is recommended by some authorities. A bank of nests, 3 high and 8 units wide is built against the side wall towards the front of the house. Nests are 1 foot wide and high and 1 foot 4 inches deep. The drinking fountain is usually located at the center purlin support post. The feed hoppers are placed on either side, running perpendicular to the front of the building.

Wiring Poultry House

In wiring poultry houses, it is recommended that a three-wire system be used, providing two live wires and one ground return. This permits control of the lights on one circuit and independent operation and control of electric fountain heaters on the other.

Two lights are recommended, each 40 watts, located midway between the front of the roost and the front wall, and 5 feet in from the side walls. Every poultry house light should be fitted with a reflector to prevent absorption of light by walls and ceiling, and to direct the light against the floor. Lights should be suspended by a drop-cord to a level which will just put the light across the back roost.

Have White Interior

As an aid to cleanliness and better lighting both day and night, covering the interior, both walls and ceiling, with white paint or whitewash is recommended. Carbolineum or creosote treatment for the roosts, droppings boards, and for wood floors preserves the wood, kills insects and makes cleaning much easier.

Regulation of air change in this house is obtained by adjusting the front windows. When the house is closed up tight during cold weather, an undesirable damp condition usually results. This condition may be improved by having one or more of the windows open a few inches at the top to allow a restricted flow of air. If this does not give the desired results, provide a 6-inch opening along the front of the house by removing the siding just under the plate. This will allow the warm, moist air pocketed at the ceiling to escape. In order that the movement of air through this opening may be regulated, place a 5-inch board in the opening, hinge it at the bottom, and attach a pull cord at the top in order that the board may be left in any desired position. The board serves as a baffle and damper, leaving at all times, however, at least a 1-inch opening under the plate. In summer, the air circulation will be aided by removal of the side and rear window sash.

6 by 8 Backyard Poultry House

[Continued from page 31]

new Victory type droppings pit and roosts which have entirely eliminated the use of wire. This roost is made of 1½-inch square strips spaced 1 inch apart. This spacing catches eggs laid on the roosts at night. No separate roosting perches are needed, and the birds spread themselves out uniformly over the pit at night.

Pits Reduce Cleaning

This pit arrangement can be used in any poultry house and is a great labor saver. It is 18 inches high and in this there is a feature of great importance. Pullets roost easily even the first night after they are housed. The pits do not have to be cleaned oftener than three or four times a year. Seven pounds of acid phosphate for 25 birds thrown over the droppings once a week will help to keep them dry and keep down flies and odors.

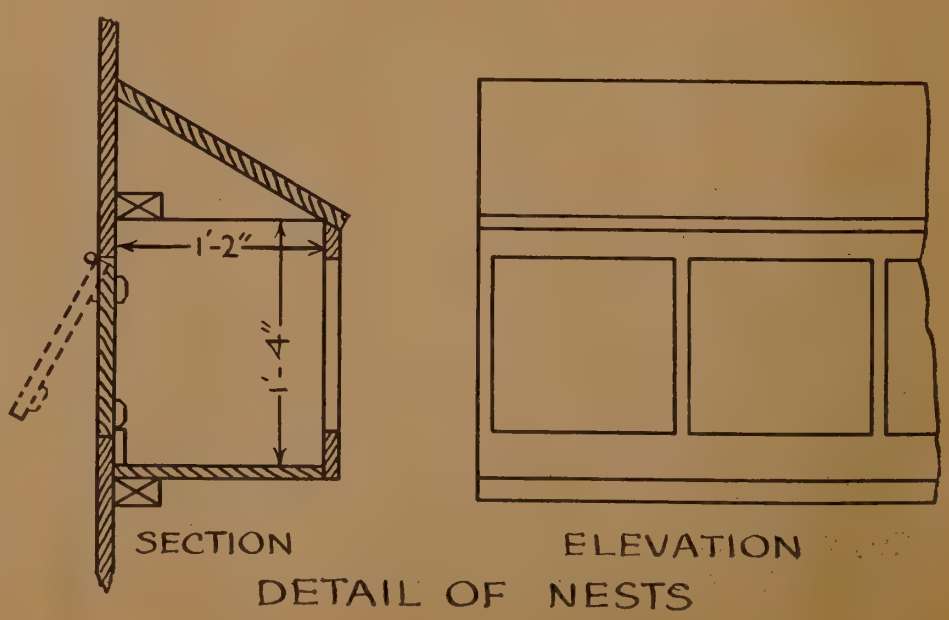
Here are a few additional important facts about Victory, backyard or family flock poultry house construction.

1. Allow 4 square feet of floor area to the bird.
2. Use glass windows in the south side in the ratio of about 1 square foot of glass to 10 square feet of floor area. Install the windows to slide in grooves on the outside wall. Make window openings adjustable with nails or pegs for different weather conditions.
3. Face the building to the south if possible, with east or west facings as possibilities. A north facing is not satisfactory in northern climates.
4. Backyard poultry keeping is usually more satisfactory if the flock has the run of a small yard. Six-foot poultry netting is needed to keep the flock in the pen.

Approximate Bill of Materials

(Structure Only)

Joists—7 pieces 2"x4"x6' long
Sills—2 pieces 2"x3"x14' long
Studs—2 pieces 2"x3"x10' long
Studs—1 piece 2"x3"x6' long
Girts—2 pieces 2"x3"x14' long
Header—1 piece 2"x3"x6' long
Header—1 piece 2"x3"x8' long
Plate—1 piece 2"x3"x12' long
Rafters—4 posts 2"x4"x10' long
Ledger—1 piece 1"x2"x14' long
Flooring—60 bd. ft. 1"x6"—T & G Flooring
Roofers—100 bd. ft. 1"x6"—T & G Roofers
Siding—420 bd. ft. 1"x6"—T & G sheathing
Window guides—2 pieces 1"x3"x10' long
Window guides—2 pieces 1"x2"x10' long
Window sash—2 each—4 light 10"x10' barn sash
Roofing—1 sq.—Prepared Roll 35 lb. smooth surface
Hardware—1 pr. 8" strap hinges
1 ea. hasp and lock
Roofing nails
Common nails
2 gal. outside white paint



The Revised Penn State 20 by 40 Laying House

Construction Somewhat More Simplified and Ventilation Greatly Improved on This Popular, 200-Layer Capacity, Poultry House

By R. R. MURPHY

THE revised plans for the Penn State 20 by 40 laying house incorporate certain features, particularly in the system of ventilation, which are improvements over the original design.

Foundation walls of the house are constructed of concrete; 8 inches thick and a minimum of 2 feet 6 inches deep. A mix of 1:2¾:4 (1 sack of cement, 2¾ cubic feet of clean sharp sand, and 4 cubic feet of pebbles or broken stone) is recommended. To tie the framework of the house to the foundation wall, a ½-inch by 10-inch bolt should be embedded in the concrete about every 10 feet. A large iron washer should be placed at the lower end of each bolt to prevent it from pulling loose when the sill is fastened to the foundation wall.

Use Concrete Floor

A concrete floor is recommended. Since it is in direct contact with the ground, it is apt to be warmer and drier than a wood floor. During cold weather, a limited amount of heat may be conducted into the house through the concrete, as the average temperature of ground beneath concrete floors is approximately 58 degrees, and a transfer of heat occurs when house temperatures drop below that point.

Properly constructed concrete floors are durable and easy to clean. To aid in cleaning, the concrete can be sloped toward a floor drain, an exit door, or a pipe placed in one of the outside walls. A slope of ⅛-inch per foot is sufficient. To obtain the proper slope, as well as a smooth flat surface, place 2 by 4 forms every 6 to 10 feet. These forms can be held in place by stakes. As the concrete is poured, a straightedge should be used across the forms in order to eliminate low or high spots. A 3-inch slab of concrete on top of a 6-inch cinder or crushed stone fill makes a good floor.

For the floor, a mix of 1:2¼:3 (1 sack of cement, 2¼ cubic feet of sand, and 3 cubic feet of gravel or broken stone) is recommended. Keep the concrete moist for several days after it has been placed in order to cure it properly. When correctly prepared and cured, the above mixture produces a waterproof concrete.

Ventilation System

Ventilation of the new Penn State house is accomplished by use of glass windows and slots, all located in the front wall. Muslin-covered frames have been discarded in favor of sliding glass windows, as the latter are more permanent, present a neater appearance, and will keep out snow or rain when closed. During the summer, the entire front of the house can be opened by lowering the sash of each window into a pocket between the studs. The sash are thus protected against breakage and weathering.

A 6-inch slot, located between the top of the windows and the upper wall plate, extends across the entire front of the house. In each 20-foot pen, the slot is covered with three control doors of equal length, hinged across their lower edges. A combination of three doors, in place of one long door, affords better adjustment under various weather conditions.

The pocket into which each sash drops functions as an air intake. Air is admitted through an opening in the weatherboarding near the sill, and enters the house through a 4-inch slot located just beneath the inside window sill. This slot is also equipped with a regulating door, hinged on its upper edge.

How to Ventilate

The method of ventilating the house depends on whether or not it is insulated. A non-insulated house should be operated in much the same manner as an open-front type of house. That is, the windows should be kept open in all but stormy weather. When the windows must be closed, both slots should be open, so as to maintain a continuous flow of air through the house. At times, it may be necessary to lower each sash a little to provide sufficient ventilation. Never should the entire front of the house be closed tight, regardless of the kind of weather prevailing.

In insulated houses, the air inside is at a higher temperature than that outside during cold weather, and fewer openings are required in order to maintain satisfactory atmospheric conditions and to keep the litter dry. When a difference of 10° in air temperature exists, there is little difficulty in getting the air to circulate properly.

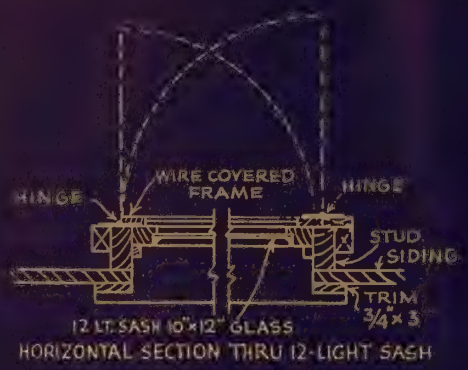
To conserve the heat produced by the birds, windows should be kept closed during the entire period of cold weather. If the house is well insulated, and is properly located, opening the slots above the windows will give sufficient ventilation. During extremely cold weather, with little or no movement of air outside, it may be necessary to open the lower slot slightly.

Service Window

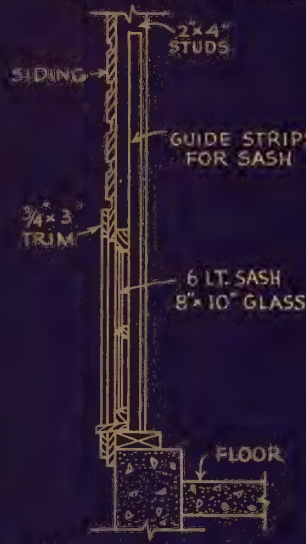
A 12-light, 10 by 12-inch glass storm sash, located at the center of the front in each pen, is convenient to use when changing litter and improves floor ventilation during hot weather. The sash is hinged along the side and swings in. A wire-covered frame of the same size, hinged on the opposite side, protects the glass.

Each 20-foot section of the Penn State house has two 6-light, 8 by 10-

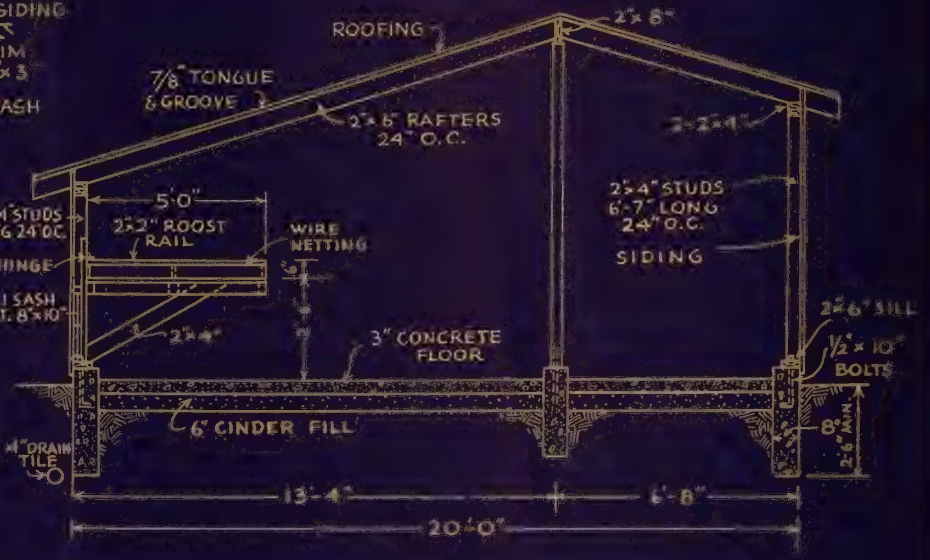
PENN STATE 20'×40' LAYING HOUSE

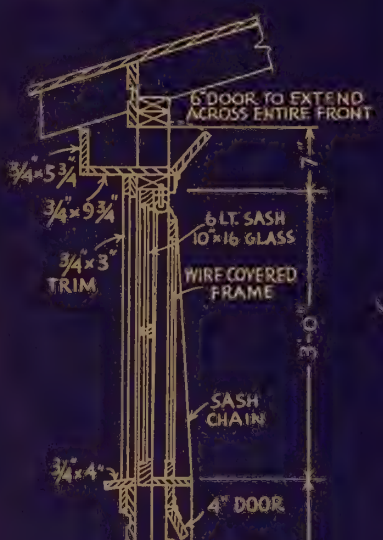


HORIZONTAL SECTION THRU 12-LIGHT SASH

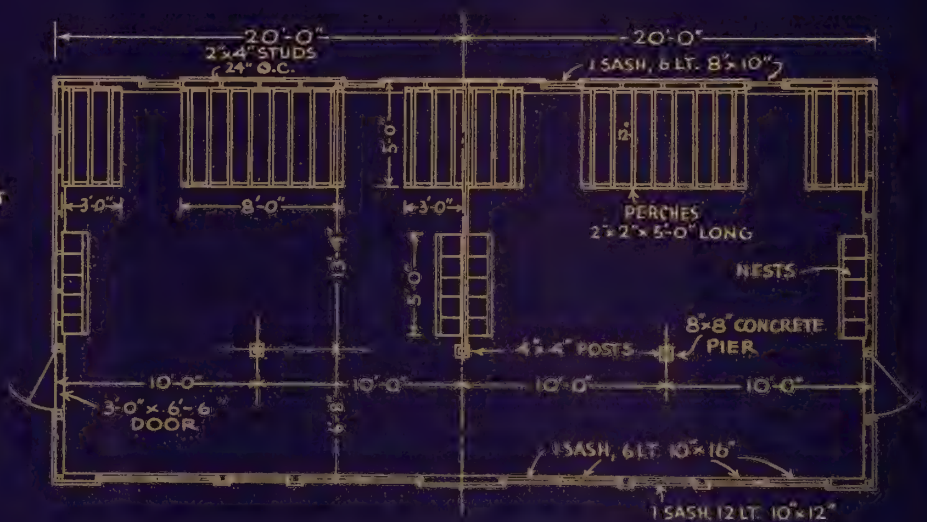


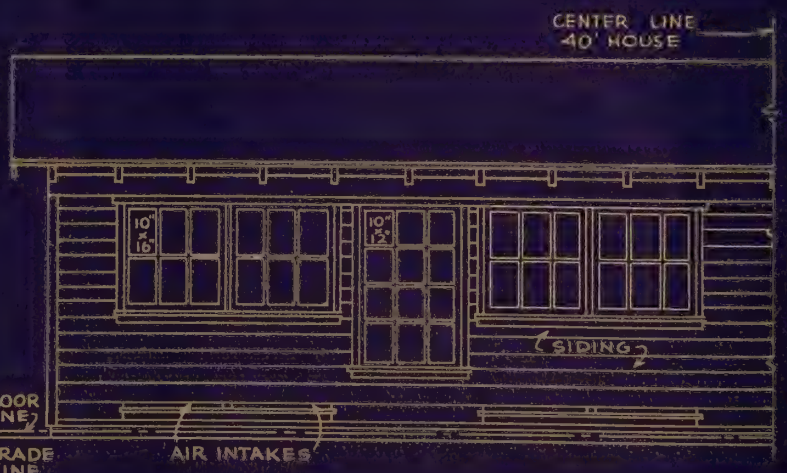
DETAIL AT BACK





DETAIL OF FRONT





The height of the center posts in the plans at the left was omitted through error. They are 4 by 4's, exactly 9 feet in height.

inch glass windows in the rear wall, located about 6 inches above the floor level. Each sash is counterbalanced by a sash weight to permit raising and lowering. These rear windows afford cross circulation of air for summer ventilation.

How to Insulate

Any approved method of poultry house insulation may be used for this house. If insulation board is used, it should be placed on the outside of the studs and roof rafters. A layer of waterproof building paper should be placed between the insulation board and siding or roofers when the board has not been coated with asphalt. A board at least ¾-inch thick is recommended.

Fill insulation (studs or ceiling lined with waterproof paper and well-seasoned matched fir roofers, and the space between the studs filled with shavings, sawdust, or similar materials) has been found effective, as well as economical. Coating each 100 pounds of shavings with 4 pounds of hydrated lime before filling in the walls will help to preserve them and repel rodents.

Choice of Roof Materials

The roof of the house has sufficient pitch to permit a choice between a number of roofing materials. Heavy roll roofing, composition shingles, metal, 17-inch overlap, or built-up roofs may be used. The roof must be well insulated if metal is applied.

Many difficulties with roofing materials can be prevented by sheathing the roof with narrow well-seasoned boards. Matched lumber, preferably fir, of 6-inch width, is desirable.

Laying houses work best when they are not over or under-populated. Each 20-foot section of this house will accommodate approximately 100 layers. As many 20-foot sections as are desired may be built, depending upon the capacity wanted. If several hundred layers are to be housed in one building, an equal number of 20-foot sections should be constructed on each side of a central feed storage and service room. Such an arrangement is convenient and reduces labor costs.

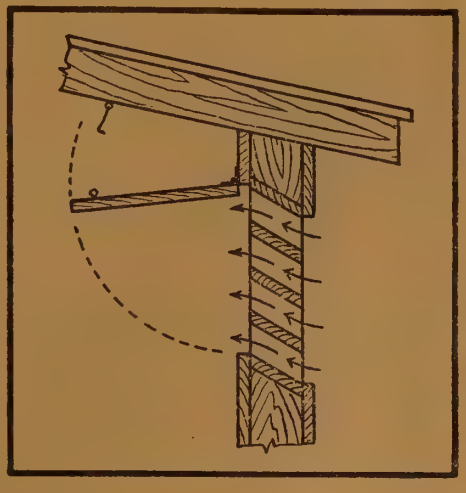
An attractive, well-built, conveniently-arranged poultry house is a satisfaction to the owner and an inducement to the hens to pay higher dividends.

Number of Nests

One nest should be provided for every 5 or 6 hens; if trapnests are used every 3 or 4 hens should be given 1 trapnest.

Cooler Houses

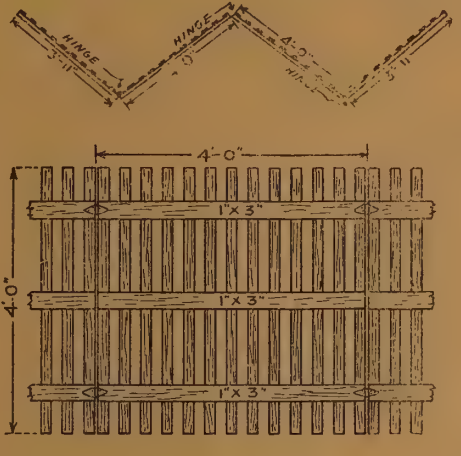
It is a known fact that egg size shows a tendency to go down in extremely hot weather. It is important, therefore, to keep the layers as cool and comfortable as possible.



Such an opening as is shown in the accompanying illustration may extend along the entire back of the laying house. Consequently, when the doors are opened and hooked at the ceiling, there is a strong movement of air through the house, even in the hottest weather.

Handy Catching Panel

A catching panel is a handy piece of equipment to have around for herding chickens into a corner of the pen or yard where they can be more easily caught for culling, worming,



vaccination or examination of any kind. It is helpful, too, in driving stubborn pullets into a catching crate, a task which is not always so easy.

Hopper Space

Allow one lineal foot of space for every 5 birds, when the hopper is accessible from one side only, half that amount when accessible from both sides.

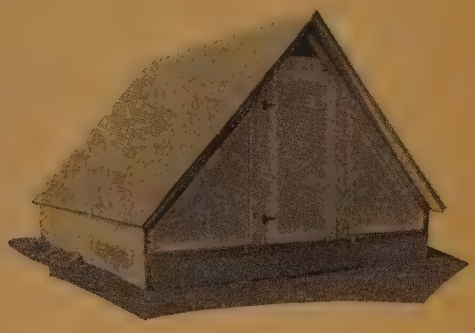
Watering utensils, unless running water is used, should be large enough to hold 1 quart of water for every 3 hens.

Floorless Brooder House

[Continued from page 30]

attached to the rafter plates and ends. A problem of construction is to keep the corners well braced and keep them square.

Litter is put on the ground the same as on board or concrete floors. Stoves are set on the ground and it may be necessary to set heavy stoves on boards to keep them level.



The completed house, its front covered with glass substitute. Note the ventilator opening.

Advantages of the floorless brooder house are:

1. Slightly cheaper to construct.
2. Easier to heat in cold weather because:
   a. Cold winds cannot get underneath the house.
   b. A certain amount of warmth radiates up through the ground.
   c. Low ceilings reduce overhead space to a minimum.
3. No floors to scrub whenever the houses are moved to new locations.
4. In hot weather they have a tendency to be cooler than houses with board floors.

Some of the disadvantages are:

1. Floorless brooder house can be used only on level ground, because it is difficult to keep out the surface water on steep slopes. Also, too much grading is necessary on hillsides to get level floors.
2. It is questionable if they are practical where a person has limited range and they cannot be moved for each brood of chicks.
3. The ceilings are rather low for tall people to work in the houses.
4. Most people ask about rat and other vermin troubles. It so happens that not one poultryman who has used them has reported any rat trouble. The rat problem may be kept under control if these houses are placed in fields away from lumber or rubbish piles or other places that harbor rats. Moving these houses to new locations for each brood may also help to eliminate a rat problem.

The plans shown are considered more as plans to give people ideas of the construction of this type of house, and farmers will modify these plans as they see fit. One poultryman changed the dimensions from 10 by 12 to 10 by 14. Another person made the front 12 feet wide and the house 10 feet deep to get more light and head room in the house. It is possible that a house 12 feet square may be a more practical size.

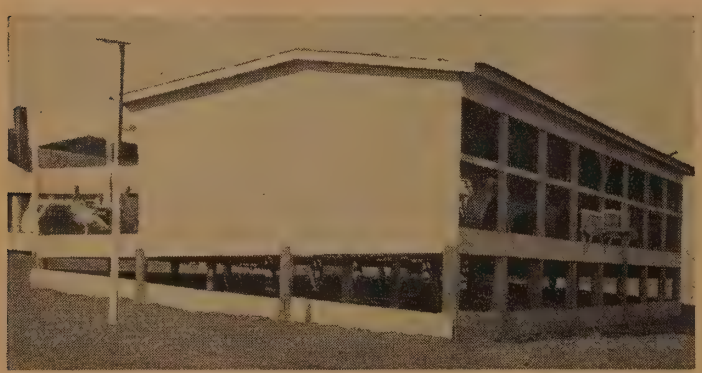
These houses can be moved by raising them sufficiently to place a skid under them. The houses should be anchored to the skid so they cannot slide off when the skid is in motion. If the house slides off the skids, an end or side of the house may be torn out.

20x40 Turkey Shelter

THIS 20 by 40 turkey shelter built by Paul Leader, York County, Pennsylvania, is actually two units, 20 by 20 each. Additional units can be added to either end. Variations in these plans can be made to meet the individual conditions and requirements.

This 20 by 40 structure will accommodate satisfactorily 150 poults to maturity, 75 per 20 by 20 unit. Paul Leader believes that not more than this number should be placed in the shelter, for even though the poultryman has good intentions of moving them when they get older, he usually does not get around to it as soon as he should, with cannibalism resulting.

Closeup of feeder at front of shelter.



View showing end and back of shelter.

This shelter on the Leader Farm faces West. The entire north end is boarded solid and 14 of the 20 feet on the south end are boarded. The rear side facing East is left open, but Leader recommends that if the front of the shelter faces South, the back of it should be protected during cold, windy weather. Removable panels hinged to drop down during mild weather could be easily added.

Slope of the land will determine the length of posts supporting the shelter. On level ground, posts should be high enough that you can reach half way under to clean out the droppings. Leader removes all of the droppings from the rear of his shelter by means of a long handled hoe.

Foundation post — Six-inch locust posts treated with wood preservative support the shelter.

Floor joists — Two by four-inch floor joists are used, as shown in the blue print. Floor pieces between joists are 1 by 4's and should be of some wood that will not split readily, such as cypress. These strengthen the joists, and help support wire flooring.

Wire flooring — Electrically welded 1 by 2-inch wire flooring is used. Large fence staples fasten down the wire along the sides of the building and 2 by 4 joists. Smaller staples are necessary on 1 by 4-inch floor pieces.

Leader stapled down one edge of the wire first, then drew the other edge tight with his truck and fence tightener. A very tight wire floor resulted.

Studs — A 2 by 4 stud is placed above the floor joists at every 6-inch foundation post to support 2 by 4 rafters.

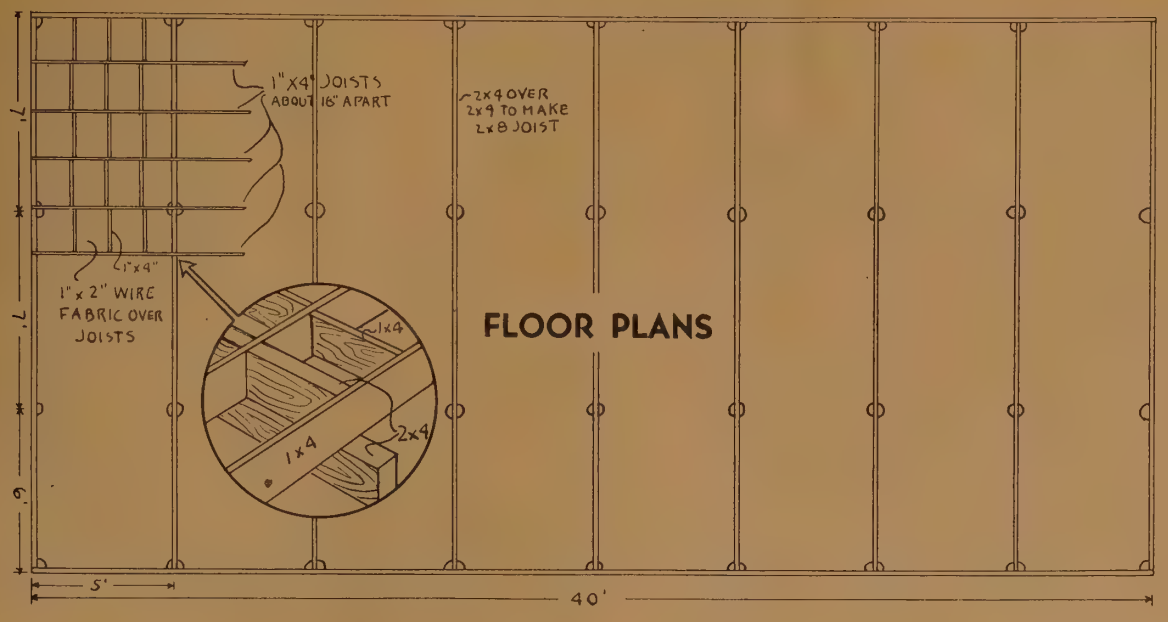
Roofing — Supports for the corrugated metal roofing are 1 by 6-inch boards of some wood not easily split. Roofing nails should be long enough that they can be clinched from ¼ to ½ inch. This will help to prevent them from becoming loose by expansion and contraction of the metal roofing.

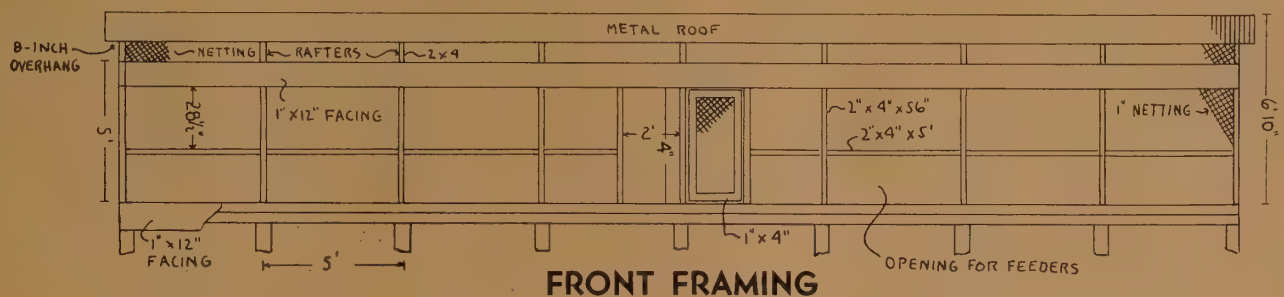
Netting — Wire poultry netting covers all open areas on the sides and front 6 feet not covered by the metal roof.

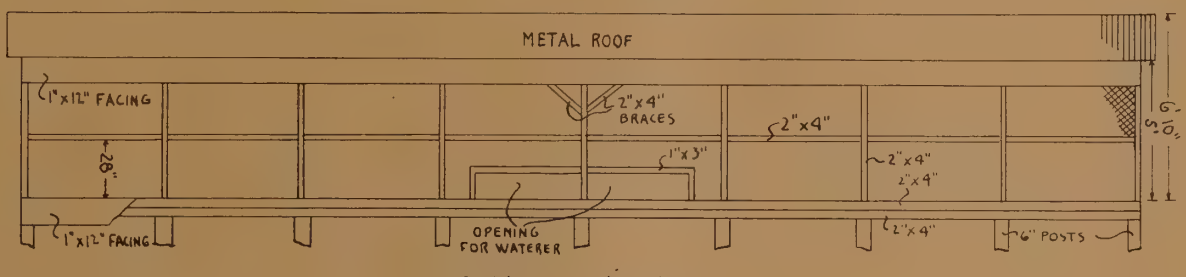
March hatched poults should be at least 8 weeks old when they are placed in this shelter, according to Leader. Later hatched poults may be put out when they are 6 weeks old, but it is necessary to build a small platform about 3 inches high in front of the feeder so that they may reach the feed. Feeders on metal straps swing out, can be filled from the outside. Aluminum paint can be applied to metal after about a year of wear.

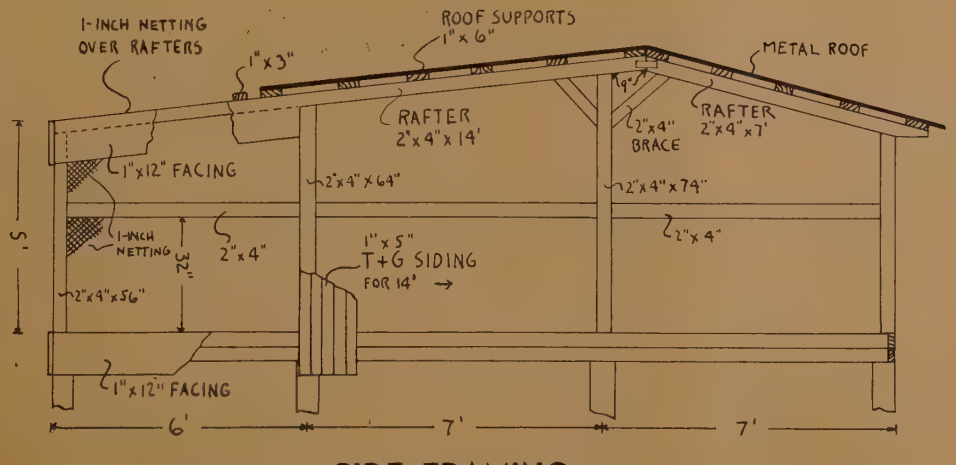
If more units are to be added, Paul Leader advises leaving solid siding over 14 of the 20 feet to stop drafts.

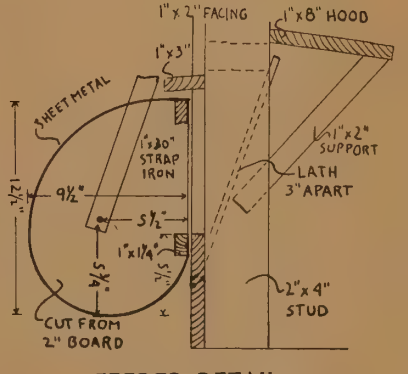
20'×40' TURKEY SHELTER











Remodeling Barns

Into Laying Houses

By JOHN VANDERVORT
Pennsylvania State College

MANY poultry raisers throughout the country have found it possible to provide economical and comfortable quarters for laying hens by remodeling farm buildings. With the scarcity and cost of building materials, any increases in poultry housing capacity for some time may have to be provided by utilizing parts of buildings which are not being

The hay mow in the east end of this barn (Clearfield County, Pa.,) was converted into a 2-story poultry house with pens 17 feet deep and 30 feet long. The ceiling height is 7 feet. The other end was similarly remodeled. The barn floor is used for feed and machinery storage. There are two moveable droppings pits in each pen. Ventilation is controlled with sliding windows and slots above and below the windows. The size of the opening above the window is regulated by a 6-inch hinged board which slopes downward to keep the water from getting into the house through the opening. Six inches of sawdust are laid over the ceiling above the second floor to prevent heat loss from the upper pen in winter and keep heat out in summer. Remodeling cost about 50 cents a hen.

The main part of this barn (Lehigh County, Pa.) was 80 by 46 feet, making two pens each on the first and third floors 40 by 46 feet. There is one pen on the second floor. All face south. Since a truck can drive right on to the old threshing floor, feed and litter can be brought into the building easily. Cleaning of the second and third floors is simplified through the use of this driveway. The lean-to on the east end of the barn provides two floors 24 feet wide and 46 feet long, making four pens nearly 24 feet square. Construction of a lean-to is a means of increasing the capacity of the building economically. Ventilation of this barn is regulated by windows which slide between strips nailed on the outside of the building. Flocks in remodeled barns are usually easy to care for.

Remodeling of this barn (Montgomery County, Pa.) began in 1930 when a 43 by 33-foot cow stable was converted into a pen for hens. Two more pens, 32 by 23½ feet, are located in the other end of the basement. An 8-foot alley on the north side of the second and third floor of the building has provided adequate space for stairs, feed bins, and equipment. The pens on these two floors are about 38 feet square. Each one is divided in the middle by a wire partition. The fourth floor, facing west, is divided into two pens 37 by 23 feet. The entire building holds about 2,500 hens. Windows sliding between strips on the outside of the building are used for ventilation. Since the top of the windows open flush with the ceiling, there is no need for a ventilating slot above them.

This is an inside view of one of the pens in the four-story poultry house at the left. Moveable droppings pits are used in this building. This type of pit is found in many remodeled Pennsylvania barns used as poultry houses, for it is an economical method of providing roosts. The roosts are high enough above the pit to allow plenty of circulation below the birds. Plenty of nests are provided along the north wall. Automatic float-type drinking fountains are located conveniently near the feed hoppers. The tile seen at the right in the picture drains the waste water from fountains located on all floors. Running water is probably the greatest single labor saving item of equipment on the poultry farm, and it should be included when remodeling buildings for poultry.

Three pens for layers have been provided at the gable end. The basement is used as an incubator cellar. Basements with stone walls on all sides are difficult to convert to good laying quarters. Glass substitute frames which slide up and down between strips on the outside of building take care of ventilation and light. Note chute for the removal of litter.

efficiently used for livestock and for other purposes.

There can be saving of labor by using barns for poultry. One can keep many hens under one roof. Adequate storage space for feed and litter can usually be provided conveniently. A corner of the basement can be used for egg storage. Litter can be cleaned from the second and third floor through chutes. Running water and lights can usually be installed without heavy expense. In fact, these conveniences may be already in the building.

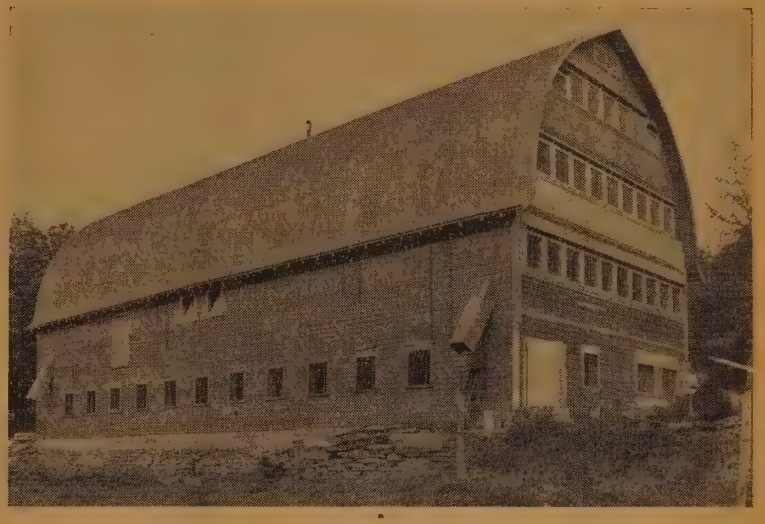
There are few buildings that cannot be converted satisfactorily into comfortable homes for hens. Each building constitutes an individual remodeling problem. Buildings so constructed as to permit openings for light and ventilation on the south side are preferred. Eastern exposures are desired in locations where south winds are common in winter. One should not give up the idea of remodeling a side of a barn even though it faces the north or west.

When one starts to remodel any part of a building, careful thought should be given to the future so as to avoid expensive changes later.

If you intend to remodel a barn or some other farm building into a poultry house, keep these things in mind:

1. Plan ahead to avoid costly changes later.
2. The foundation and roof should be in a good state of repair before you undertake remodeling.
3. To add to the attractiveness of the building, have windows of same size and evenly spaced along one side.
4. Generally, the depth should not exceed the length. If possible, have pens 20 feet or wider. Square pens ventilate better than deep, narrow ones.
5. Pens of the same size simplify the work of feeding and caring for the hens.
6. Provide convenient storage place for feed and litter. Also plan on a practical labor-saving method for removing litter and manure.
7. Make provision for running water if you can.
8. Provide strongly built stairs of sufficient width through which to carry poultry crates and other kinds of equipment.
9. When possible, provide just enough windows on sides and back of pen to give even distribution of light and cross ventilation in summer.
10. Insulate ceiling above top floor.

This small barn was rebuilt to provide two pens 30 by 30 feet. An 8-foot space at the rear of each pen takes care of feed storage and supplies. Well spaced windows on the east and west sides assure good light distribution and cross ventilation. The ventilating board above the windows on the south side is easily adjusted by a lever inside. The large window at the front of each pen facilitates cleaning and can be opened in hot weather.

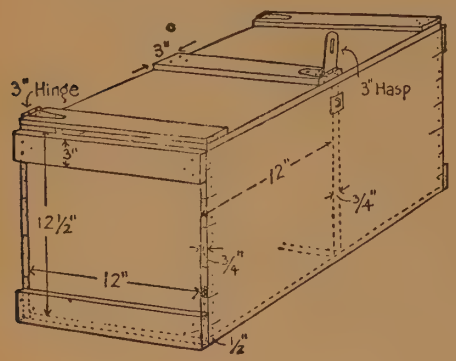


Once a dairy barn, it now has eight 35 by 30-foot pens for layers. A feed room 8 feet wide has been provided in the middle of the barn between the two pens on each floor. Sliding windows with slots above and below the windows take care of light and ventilation. The east end of barn is shown here. The west end is similar. Two manure chutes, which simplify cleaning, are shown here. A layer of shavings above the top floor provides good insulation.

Two pens, 16 by 16 feet, were built above the old cow stable, a practical way to provide quarters for a small flock. Windows slide down on the inside, while a 6-inch board, hinged at the top, provides a ventilating slot above windows. Side walls and ceiling were insulated with shavings. One-half pound hydrated lime to each bushel of shavings used for insulation helps keep rats and mice away.

Egg Case Ideas

Make egg cases out of orange crates —that's an idea originating with L. M. Hurd, Cornell University Poultry Department. His plan calls for 150-size orange boxes. This size has to be built up 1½ inches, which can be done by nailing a strip on top of end and center pieces. In addition, strips are nailed up and down on the sides of the crates for strengthening.



For poultrymen who deliver eggs to stores, Mr. Hurd recommends a permanent case that is returnable. "Build enough," says he, "so you can exchange cases when delivery is made."

The kind of case he suggests is made of half-inch matched pine box lumber, with top hinged and a three-inch hasp on it. (See the sketch.)

Homemade Pushcart Proves Handy for Taking Feed Over Range

To take feed over the range and for moving crates of birds from one place to another on the farm, we use a pushcart made from the rear axle and wheels of an old light buggy. We had the axle dropped so the platform body, which is about 2½ by 4 feet, is approximately 15 inches from the ground. It was not necessary to cut the axle as the process of bending brought the wheels in to about 3½ feet apart. The wheels are high and roll easily even with a load of 200 to 300 pounds.—**Leon Bailey, Maine.**

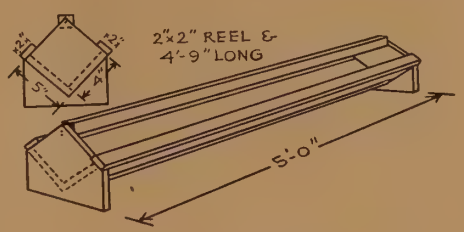
Turkey Roost and Shelter

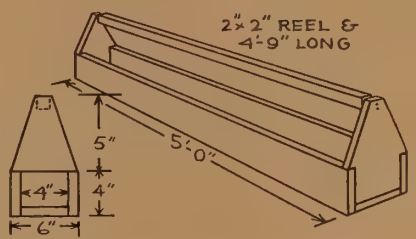
Ellis H. Esbenshade, Ronks, Pa., developed this novel turkey roost and shelter. A framework of rough lumber is mounted on a wagon undercarriage. Over the roosts so constructed, another framework supports a metal roof and sunshade. Atop the metal sheets are more roosts. It's a simple matter to move the shelters, as a tractor can be hooked on and several rolled across the range at one time.

Windows Are Easy to Adjust

Window adjustments for proper ventilation require only a few minutes on the Alampi Poultry Breeding Farm, Gloucester County, N. J. The windows for two 24 by 24 pens are suspended from a single pipe extending through the studding which frames each window as shown at the right. By turning a handle attached to an awning coupling on the end of the pipe in the feed room, the windows are quickly raised or lowered. At no time are the openings closed entirely, for this would result in damp litter. This is a real time-saving idea in construction.

Chick Feeders You Can Make





If you can't buy chick feeders, here are two which you can make yourself. They are intended for use when the chicks are from 2 to 7 weeks of age. One, you will notice, is flat bottom, while the other has a V-shape trough. The plans come from North Carolina State College.

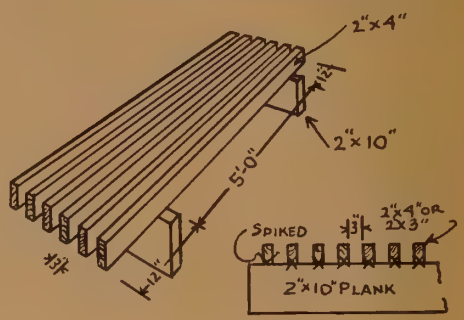
Wooden Strips for Shelter Sides

An idea picked up at Ohio Poultry Day was a range shelter made with strips of rough oak used in place of poultry netting, for sides and floor.

Since then the experience of flock owners shows that wooden strips are all right—particularly when wire can't be had. And if it's a good substitute for use in range shelters, why not use it in the laying house, to keep layers out from under roosts, or to cover droppings pits?

When you use strips for covering droppings pits, put them on frame sections, so you can take them off and replace them with little trouble. Space between strips should be about the same as the diameter of the mesh in poultry netting. Size of strips should be an inch square, or even 1½ inches, to carry a good load.

Feed Storage Rack



The Maine College of Agriculture suggests this type of rack construction to protect feed on the farm from the damage of rats and to provide good movement of air around the bags.

No Loafing on Window Ledges

To prevent the layers from fouling the window ledges or sills with droppings after the windows are removed from the houses in summer, the Demme Brothers of Sewell, New Jersey, use a 4-inch board or reel which rocks or tips when a bird lights on it. This closeup shows how one end is held in place.

Insulation in Construction of Poultry Houses

FROM every phase of poultry husbandry, there comes the need for better insulation of poultry houses. No matter what branch of this great industry you are interested in most, from the hatching of chicks to the producing of market eggs, the need for proper poultry house insulation is apparent.

One of the common, as well as main causes of colds in baby chicks is a poorly insulated brooder house floor. When the wind sweeps under the brooder house and creeps up through a floor of single thickness, it is no wonder that the baby chicks huddle together under the hover trying to keep warm when they should be out, busy at the feed hoppers and water fountains. Cold air rushing through the cracks and crevices in the floor by no means prevents the condensation of moisture on the floor. On the contrary, this cold air, coming in contact with the warm, moist air in the room, helps to keep the litter wet.

Older Birds Suffer Too

But it is not only baby chicks for which insulated houses are necessary. A large number of colds in older poultry as well as baby chicks may be attributed definitely to poor insulation. And keeping the hot air out of the poultry house in the summer time is of just as much value as keeping the cold air out in the winter time. The use of a high grade insulating material, thus, may insure a double protection.

Research has proved that hot weather in the summer time reduces egg size. Insulation will keep the room temperature lower during the hot summer days, thus tending to maintain large egg size. Likewise, insulation will keep the temperature of the room up in the winter time so that egg production will not fall, thus reducing the feed bills during the winter months.

A good insulating material, therefore, maintains a more regular and uniform temperature; helps circulation of air, which in turn aids in the proper ventilation of the building; prevents sweating or condensation of moisture on both the ceiling and the floor; and, since it has much greater bracing strength than ordinary siding, results in a stronger and more durable house.

In other words, the health of the birds is improved; more poultry and eggs will be available for market; the litter, fuel, and feed costs are reduced; the amount, and thus the cost of labor, are cut down; and the life of the house is lengthened. All of these factors contribute more profits to the poultryman.

Insulated Floors Help

One method of keeping the cold air from seeping through the floor, such as is found in most brooder houses, is to put down a sheet of insulation board over the joists before applying the wood flooring. This is shown in the accompanying diagram.

Often the poultryman will find that the added protection is secured by placing a piece of a water-proof paper between the insulating board and the lumber flooring.

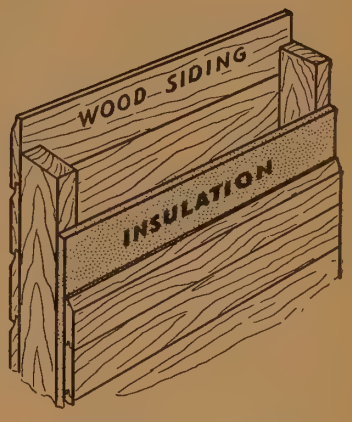
Insulating the Walls

Insulation board is used in various ways in constructing the walls of the brooder house and other poultry houses, the specific kind of board, of course, depending upon available materials and their cost, the kind of climate prevailing, and the type of wall desired. Sometimes it is used as the siding itself.

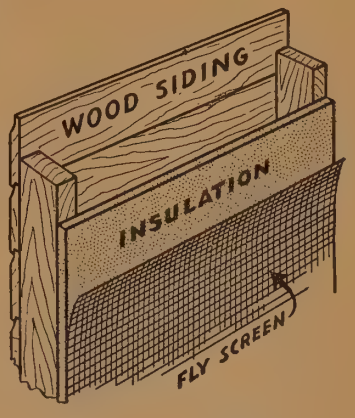
However, it should always be applied according to the instructions of the manufacturers. Some manufacturers recommend the practice of moistening the boards and stacking them for a while before using them, but this depends upon the kind of board used. Sometimes the boards are nailed vertical and sometimes horizontal to the floor. It is advisable to nail along the edges after nailing to the intermediate frame members.

The nails used are the standard galvanized roofing nails, 1¼ inches in length with ⅜-inch heads. For the extra-thick insulation boards eightpenny nails are recommended. The nails should be spaced 3 inches apart along the edges, and 6 inches apart along the intermediate framing parts, with the heads of the nails slightly below the surface of the board. Care should be taken that the boards are not forced into position. A space ranging from ¼ of an inch to 1 inch between the boards to allow for expansion is advised by some manufacturers of insulating boards.

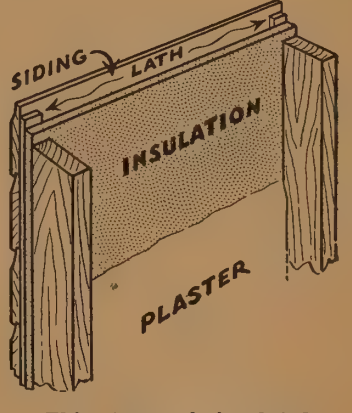
The studs should be 18 inches apart when the insulating board is used alone as siding, rather than the regular 24 inches between studs which is customary when wood siding is used.



This is the type of wall construction used in many laying houses at the present time. The insulation board is covered with wood sheathing to a height of 22 to 24 inches to guard it from damage through picking.



Ordinary fly screen is applied to insulation by many poultry raisers as one way to protect it from damage by the birds. Apply it snugly, for otherwise, it will result in dirt and litter accumulating there.



This type of insulated wall does not give a smooth interior, but it does not furnish any hiding place for rats. The plaster protects the insulation against picking.

This helps to prevent any possible sagging between the studding. Strips of batten, usually 1 inch by 4 inches, should be placed over the junctions of the boards.

Protect Insulation When Exposed

When the insulating boards are used as the siding, they are usually sized and painted on the outside for weather protection. For the sizing, one manufacturer of insulation board recommends dissolving 1½ pounds of shell or chip glue in one gallon of boiling water and applying swiftly and evenly while it is still warm. Then two coats of a good lead and oil paint should be applied.

Preventing Picking of Insulation

Since chickens sometimes acquire the habit of picking at the insulation board, some protection must be given from a height of from 22 to 24 inches above the floor and around the roosts and places where the birds can perch and peck at the boards.

Various methods of protecting the insulation have been tried. Some have found that simply by spraying with a thick solution of white-wash the birds can be kept from picking the boards. Others have found that a ¼-inch coat of plaster is necessary. Still others merely tack board sheathing, metal covering, or roofing felt on all areas that can be reached by the chickens.

The use of ordinary fly screen is recommended by some manufacturers of insulation board to protect it from the chickens. This must be fastened on tightly so that particles of dirt and litter will not lodge between the screen and the board.

A second method of insulating the walls is to nail the insulation board on the outside of the studding, followed by strips of laths or ½ inch boards at the studs, and then the regular lumber siding. Although this type of insulating does not furnish a smooth inside wall, it is quite advantageous in that it provides no place for the rats, mice, and other pests to hide and make a nest.

A third way of insulating the wall is to place the boards on the inside of the studding, with the wood siding on the outside. In the accompanying illustrations you may see how this appears, with wood sheathing and wire screen used as protection from the picking by the birds.

Insulating Roofs

As for the roofs, most insulation boards can be used directly beneath the roofing boards, which in turn are covered with roll roofing, or whatever form of roofing material that you think best, or the insulation boards may be used as a lining, being nailed on the inside of the rafters. This latter method has the advantage of giving a smooth ceiling.

If you are contemplating insulating some of your old houses, or if you intend to use insulation in building any new houses, do not hesitate to write for information and specifications from the various manufacturers specializing in such materials.

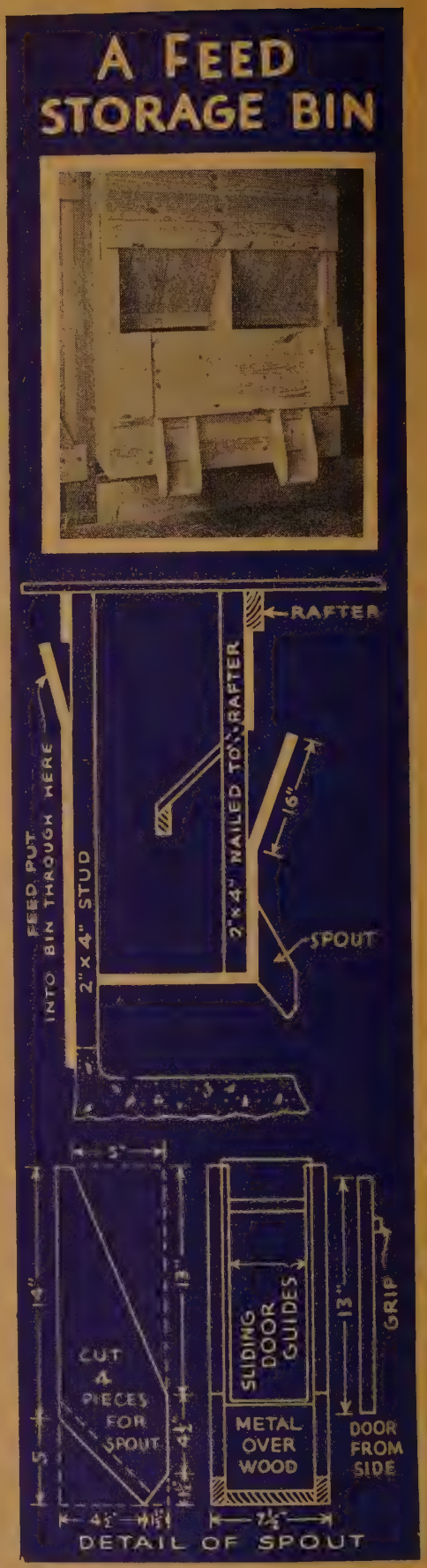
Edwin Carey, Ohio White Leghorn breeder, has practically eliminated breakage of eggs in the nests through the adoption of the type of nest shown here.

The tier of nests illustrated is 6 feet long with only one partition through the center, making each individual nest compartment 3 feet long and about 1 foot in depth. Carey finds that this method of construction makes it impossible for the hens to crowd each other and break eggs as so frequently occurs when two hens crowd into the ordinary small nest at the same time.

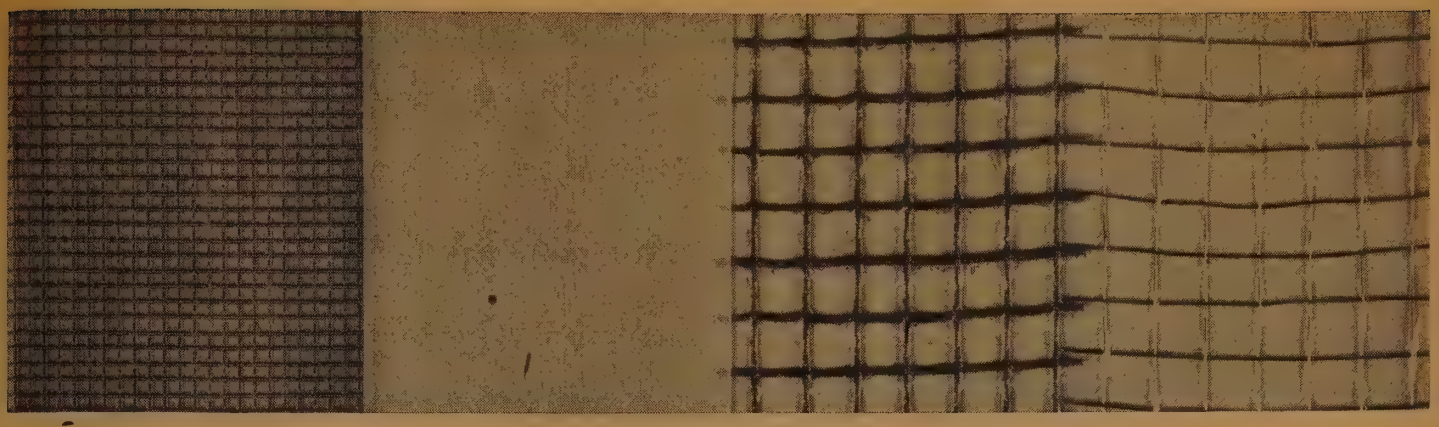
While the compartments shown here are only 3 feet long, Carey builds the majority of nests in tiers 8 feet long with one partition, making compartments 4 feet in length.

Since the nests are faced toward the wall, assuring reasonably dark compartments, there is no trouble with fighting or vent picking which sometimes gets started in a flock when one hen picks at another that is in the act of laying.

The back of the nests is covered with a heavy burlap curtain which is pushed aside when the eggs are gathered. The curtain has the added advantage of allowing better circulation of air in the nests during extremely hot weather.



This type of feed bin, located at one end of each of the long laying houses on the Guy Leader farm, York County, Pa., is quite a time saver. The bin has mash and grain compartments and is arranged so that it can be filled from the outside. Dimensions given here can be adapted to your own particular situation.



Four types of glass substitute are illustrated here in actual size of the mesh. Starting from the left: 1. Fine mesh wire base covered with cellulose acetate; 2. Treated closely woven fabric base; 3. Wide mesh fabric base covered with cellulose acetate; 4. Wide mesh wire base covered with cellulose acetate.

The Use and Application of Glass Substitutes

THE use of glass substitutes for poultry houses is increasing rapidly. A knowledge of the importance of ultra-violet rays is causing many poultrymen to turn to glass substitutes as an economical and satisfactory way to secure adequate supplies vitamin D for their birds.

Glass substitutes permit the transmission of ultra-violet rays which furnish vitamin D. The necessity of a sufficient amount of vitamin D in the ration in order that healthy chicks may be produced and high egg production may be maintained is well-known.

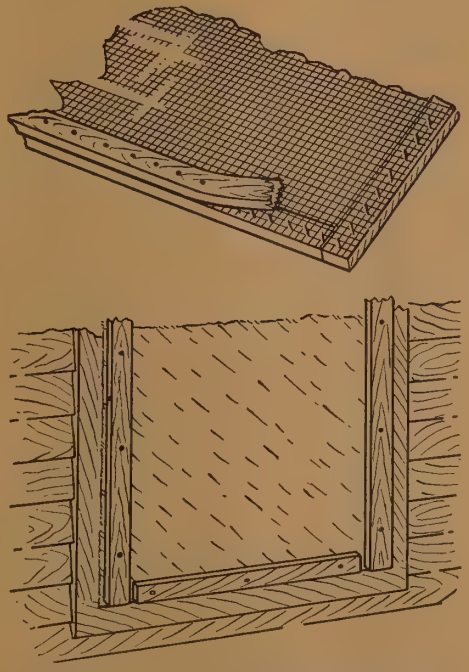
In common usage, muslin and other materials which are sometimes used in poultry houses do not come under the classification of glass substitutes, as they afford no protection against the elements other than minor protection against snow and rain and will not satisfactorily replace glass. The glass substitutes referred to here are those manufactured especially to transmit ultra-violet rays and still give the protection which would be given if common glass were used.

The principal practical difference between high quality glass substitutes and common window glass is that the substitutes will permit ultra-violet rays to pass through, whereas common glass does not.

Faster Growth

Striking examples of the effectiveness of glass substitutes has been demonstrated by tests in which identical lots of chicks were brooded under glass and under glass substitutes. Faster growth, greater vitality, and less disease resulted from the transmission of ultra violet rays through the glass substitutes. Smaller chicks, lower vitality, and higher susceptibility to disease were found in chicks brooded under normal glass without vitamin D concentrates.

Tests at the Iowa State Experiment Station, the Manitoba Experiment Station, the Ohio State Experiment Station and the Wisconsin State Experiment Station have proved the superiority of glass substitutes over common glass for brooding chicks. At the Iowa Station, 10 weeks-old chicks raised under a glass substitute weighed 708.5 grams each while chicks raised under window glass weighed only 484 grams each. In two tests of 50 chicks each at the Manitoba Experiment Station, 47 were brought to maturity when brooded under a glass substitute while only 34 lived to maturity when brooded under window glass. Investigators at the Ohio Experiment Station said "Enough of the effective ultra violet rays were transmitted (by a glass substitute) to offer protection against leg weakness." The Wisconsin State Experiment Station test resulted in unmistakable symptoms of leg weakness (rickets) when chicks were brooded behind ordinary glass, but there were no symptoms of rickets when chicks were brooded under a glass substitute.



Here are two ways of applying glass substitutes. The upper diagram shows it being applied to a special frame or sash, while the lower diagram shows it tacked directly to the house over the window opening and held in place by laths.

Hatchability Increased

Greatly increased hatchability has resulted when ordinary glass was replaced with glass substitutes. Increases up to 20 per cent in this respect have been noticed.

Glass substitutes are applied by tacking the material directly to the window frame or, if removable sash are desired, by tacking the material to a frame which has been made to fit the window opening. All of the popular types of substitutes can be cut with ordinary shears. No special tools are needed in putting them on. None of the types require the use of putty.

As common glass requires occasional washing, so do glass substitutes need cleaning. Ultra-violet ray transmission is cut down by accumulations of dirt and dust. Following manufacturer's directions for cleaning will assure the maximum amount of ray transmission.

Although glass substitutes may be punctured or broken, they are not nearly so liable to be damaged as is common glass. Any punctures or breaks which do occur can be readily mended. In many cases, only the area immediately surrounding the break will need mending, whereas common glass shatters and requires an entirely new section.

Any of the houses for which directions are given in this Blue Print Book can be equipped with glass substitutes at a reasonable cost. Merely figure the square inches of material needed and order a sufficient number of rolls from your dealer in place of the glass indicated in the bill of materials.

Hen Shelter on Farm of G. C. Morgan, Connecticut.

24x24 Hen Shelter

Provides Space for the Hens That Are Carried Over the Summer and Early Fall

THIS 24 by 24-foot shelter for laying hens will accommodate approximately 300 birds. The low A-roof construction provides protection against storms and hot sun, is resistant to winds, and permits abundant ventilation.

The roof is built of 2 by 5-inch or 2 by 6-inch rafters to insure strength and to withstand heavy weight of snow. Rafters are spaced 3 feet on centers for a boarded roof covered with roofing paper, and 2 feet on centers when sheet metal roofing is used. Matched roofers are used for boarding to prevent wind from blowing between cracks and ripping off roofing paper.

Galvanized Roofing May be Used

Of the galvanized sheets of iron and steel, the corrugated type is probably the strongest. The 26-gauge sheets are the most practical for this purpose. The heavier the zinc coating, the longer the sheets will remain rust-free. Galvanized sheets come in various lengths, are made so that when lapped, they cover a net width of 2 feet.

When rafters are spaced 2 feet on centers, the laps come directly over the rafters, providing a good grip for nailing. It is best to run strips of boards crosswise to the rafters, spaced to serve as supports at the ends and middle of the metal sheets.

Enclose the sides and ends of the shelter with wire netting. Folding sections can be hinged to the sides and adjusted according to weather conditions. The rear may be covered with heavy paper or bags in cold, windy weather.

Doors large enough to admit a truck or wagon when cleaning may be provided at one or both ends.

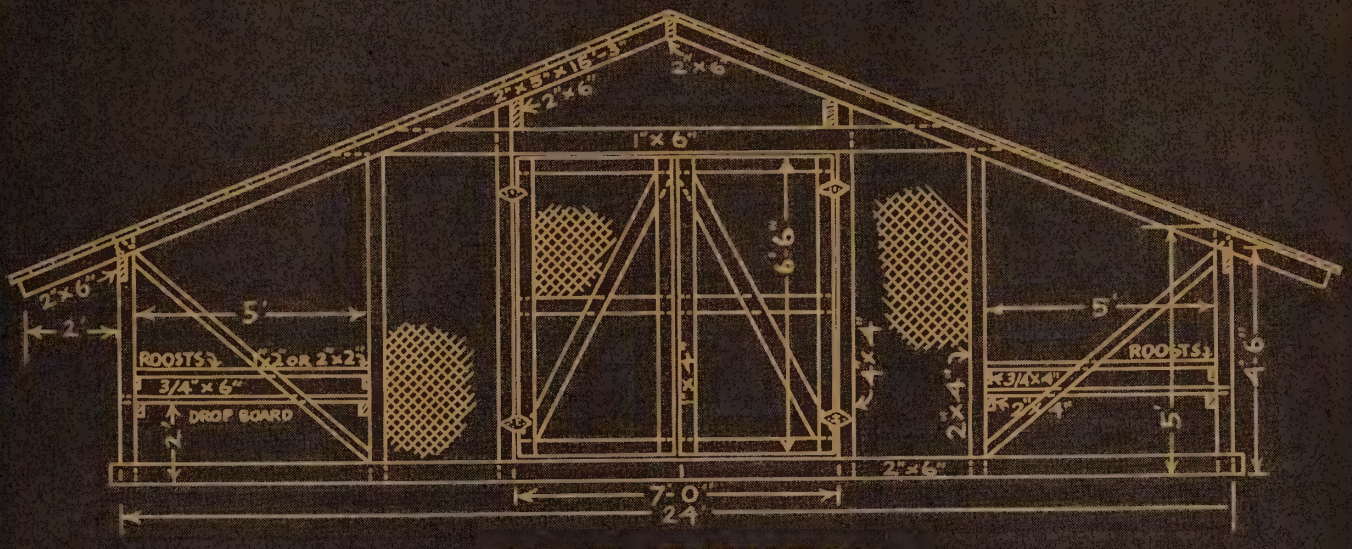
Place nests in center of building. Where manure pits are used, and hinged sides are provided for protection against storms, roosts may be constructed 6 inches to a foot nearer the ground than roosts used above dropping boards.

Plans for this hen shelter are presented through courtesy of Wirthmore Feeds, Malden, Mass.

Bill of Material

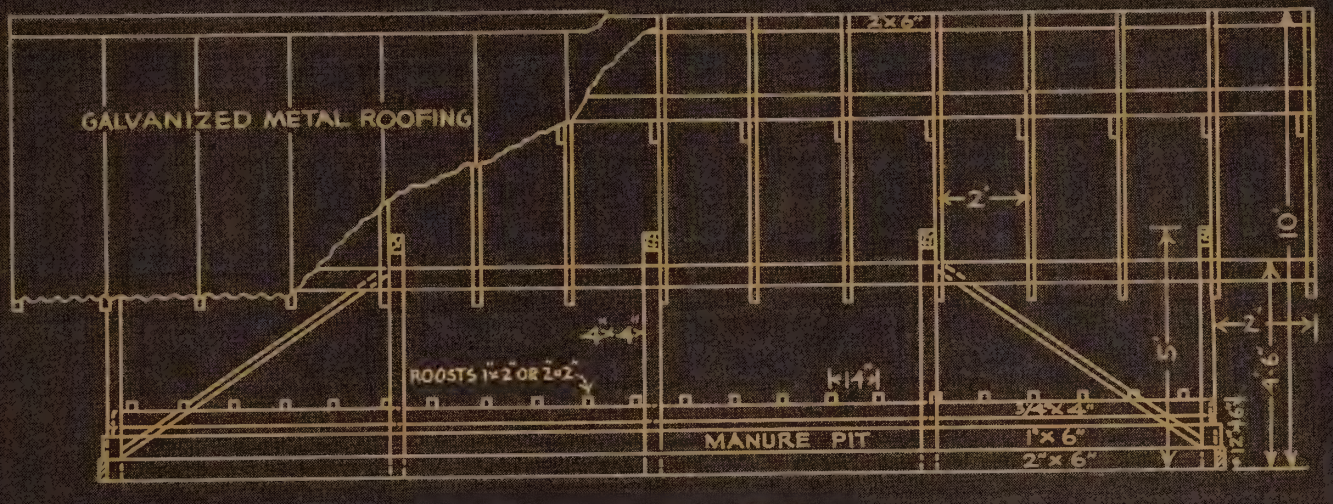
Rafters (3′ on centers) or	22 — 2″ x 5″ x 16′
″ (2′ on centers	30 — 2″ x 5″ x 16′
Studs (sides)	10 — 4″ x 4″ x 5′
″ (ends)	4 — 4″ x 4″ x 9′
″ ″	4 — 2″ x 4″ x 7′
Braces at Corners	8 — 2″ x 4″ x 7′
Plates	4 — 2″ x 6″ x 14′
Purlins	4 — 2″ x 6″ x 14′
Ledger Boards	2 — 2″ x 6″ x 14′
Planks (sides at bottom)	8 — 2″ x 6″ x 12′
Cross Ties	15 — 1″ x 6″ x 14′
Saddle Boards	2 — ⅞″ x 4″ x 14′
″ ″	2 — ⅞″ x 5″ x 14′
Doors	8 — ⅞″ x 4″ x 6′6″
″	12 — ⅞″ x 4″ x 3′6″
″ (braces)	4 — ⅞″ x 4″ x 7′
Roost Frames	
Frame (ends)	12 — ¾″ x 6″ x 5′
″ (sides)	12 — ¾″ x 4″ x 8′
Roosts	40 — 1″ x 2″ or 2″ x 2″ x 5′

24' × 24' SUMMER HEN SHELTER



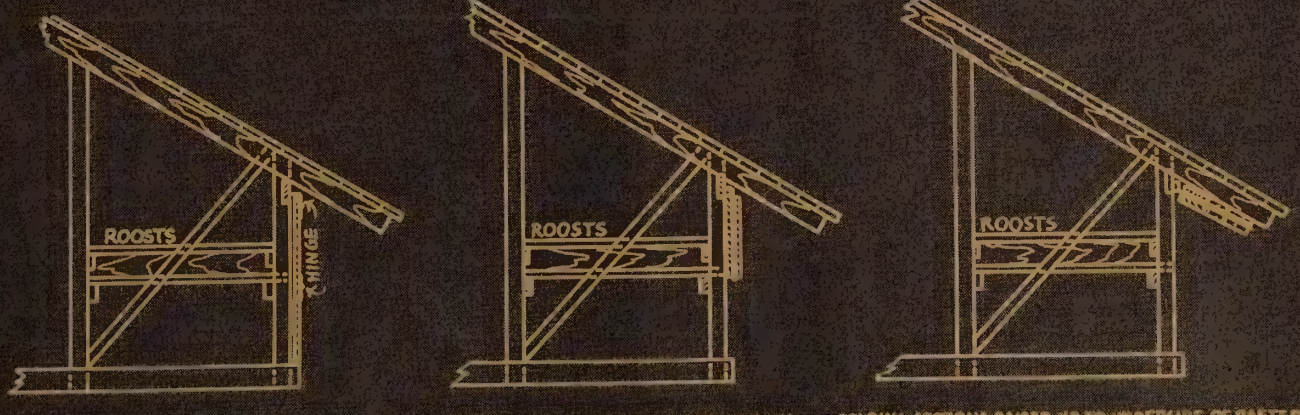
FRONT ELEVATION

SHOWING END VIEW OF ROOSTS AND DROP BOARDS



SIDE ELEVATION

SHOWING ARRANGEMENT OF ROOSTS AND MANURE PIT



FOLDING SECTION DROPPED DOWN — PART OF FOLDING SECTION DROPPED DOWN — FOLDING SECTIONS RAISED UP TO UNDERSIDE OF RAFTERS

FOLDING SECTIONS OF BOARDS ON SIDES OF SHELTER FOR PROTECTION AGAINST STORM & WIND

Massachusetts
24x24 Two-Story Laying House

By G. T. Klein
Massachusetts State College

PLANS for a Massachusetts poultry house have been in the making for several years. From a narrow, open front, single wall house has evolved a completely insulated building with glass windows, regulated slots for ventilation and much deeper than houses of a decade ago.

The house is designed principally for multi-story construction. Double deck houses are very common and in the state can be found buildings up to six stories in height. If the construction is right and the houses are properly framed and braced, there seems to be no difficulty with the multi-story building. Such buildings ventilate just as simply as single story houses.

In Massachusetts the difference in construction cost of an insulated and an uninsulated building is about $1.00 a bird capacity. It is considerably lower per bird in a multi-story building than in a single-story building because of proportionately less wall and roof space to be insulated. Spread over a period of years, the cost of insulation in the multi-story house does not seem excessive.

On farms where both insulated and non-insulated types of houses are in use, the value of insulation is well appreciated. It can be said for it that litter can be kept dry more easily, water seldom freezes and such a house is a more comfortable place to work.

24 by 24 Favorite Size

The new poultry houses of Massachusetts range from 24 to 30 feet in depth. Twenty-four feet is a favorite size. Rooms are usually 24 feet in width with solid board partitions between them. They ventilate adequately in practically all cases from the south side with the aid of slot and window adjustments.

In houses 30 feet in depth, double sash windows are frequently used. In 24-foot houses a combination of single and double sash windows work well. In 20-foot houses a row of single sash windows across the front of the house is usually adequate for light and ventilation.

Method of Ventilation

The ventilation for this house consists of a combination of sliding adjustable windows and ventilating slots. The openings may be equipped with ordinary window glass, glass substitutes or some other non-ventilating material that will admit light.

Single sash windows, usually slide into frames in the wall where a 1-inch slot is necessary for drainage. This slot is also used for ventilation. The air which enters on a level with the floor rises between the outside sheathing to empty into the house midway between floor and ceiling. These low slot openings should be equipped with inside valves, so that they may be completely closed.

A ventilating slot, 4 to 8 inches wide, depending upon the depth of the pen, is placed along the entire front at the highest point above the windows. The slot openings are equipped with a simple board hinged at the top to swing out and make their own over-hang to prevent storms from beating in. There should be four to six of these in each 20 to 24-foot wide pen. Often, in severe cold or windy weather, the house is ventilated from these slots alone or two or three of those in the center of each room.

Other ventilation adjustments consist of rear windows in the north wall which are opened during hot weather to allow free circulation. These windows are located below the droppings board when this feature is used, but considerably above the roosts when the droppings pit is constructed.

House Should Face South

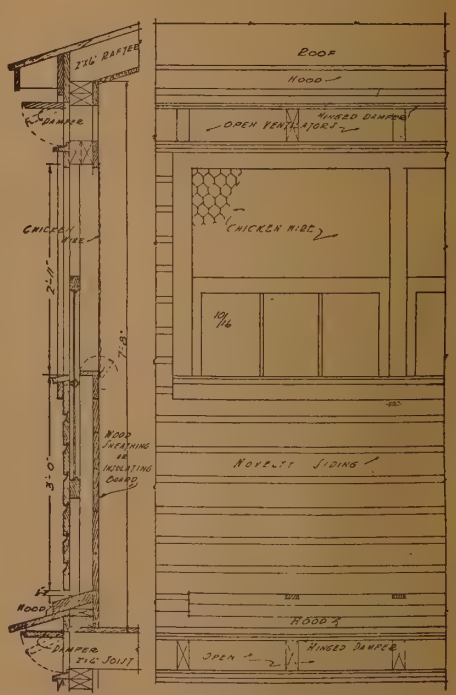
The plans are designed for the buildings to face southward. This orientation may be varied slightly without seriously affecting results. Laying houses should be located to avoid shadows of trees, windbreaks, or farm structures.

A foundation about 24 inches in depth is usually sufficient to give the building a good foundation. This is sufficient to keep rats from burrowing under it. As further precautions against rats, concrete floors are recommended for the first story with all drain and sewer outlets screened. The space between joists and studs, where sheathed, sealed or otherwise closed in, should be rat-proofed with barriers of wire cloth or sheet metal directly above the droppings board and nests and in other places where rats can stand and gnaw into the wall.

House Should Be Well-Braced

In two-story poultry buildings, 2 by 4-inch framing must be used for side walls. A common fault is lack of bracing. It is particularly noticeable where structures are covered with roofing felt. The lack of bracing and nailing was very evident in buildings destroyed in the hurricane which struck New England in the fall of 1938.

The plans for the Massachusetts house make use of short-length lumber which is plentiful in New England. This permits the use of native-grown material, which in some instances, can be harvested from the woodlot. The lumber should not be used "green" because this causes damage to the roof and framing by lessened holding

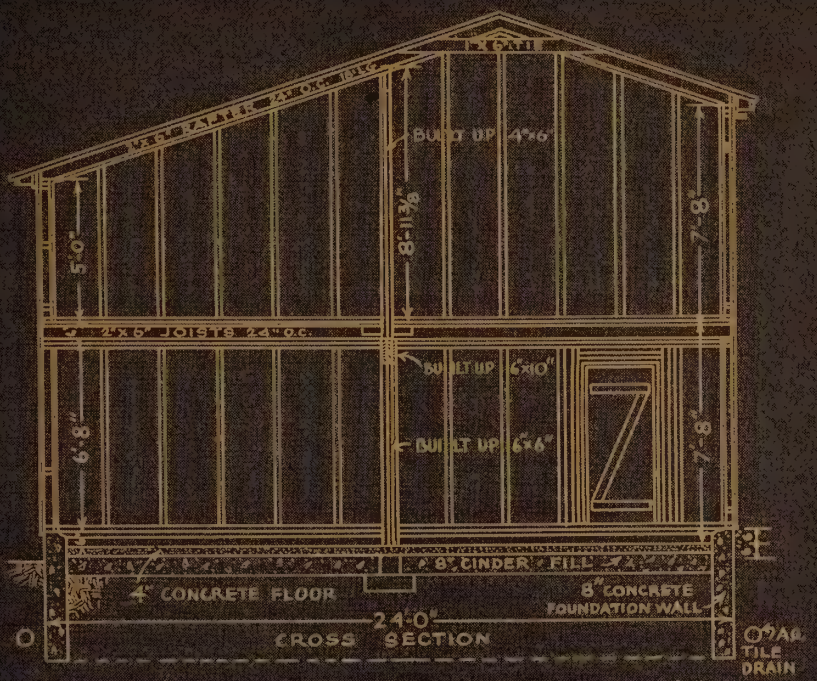


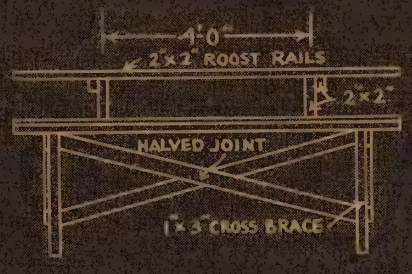
Here is a front view and also a cross section of the front of the house with the single sash windows. The dampers and sash should be suspended from cords which are counter-weighted. This will make more accurate adjustments of the openings possible. The lower slot opening above the hood is largely for the drainage of water blown against the windows, but it can be used as an air intake in foggy and rainy weather when the windows have to remain closed. In such cases, the hinged ledge back of the window sill is simply turned back.

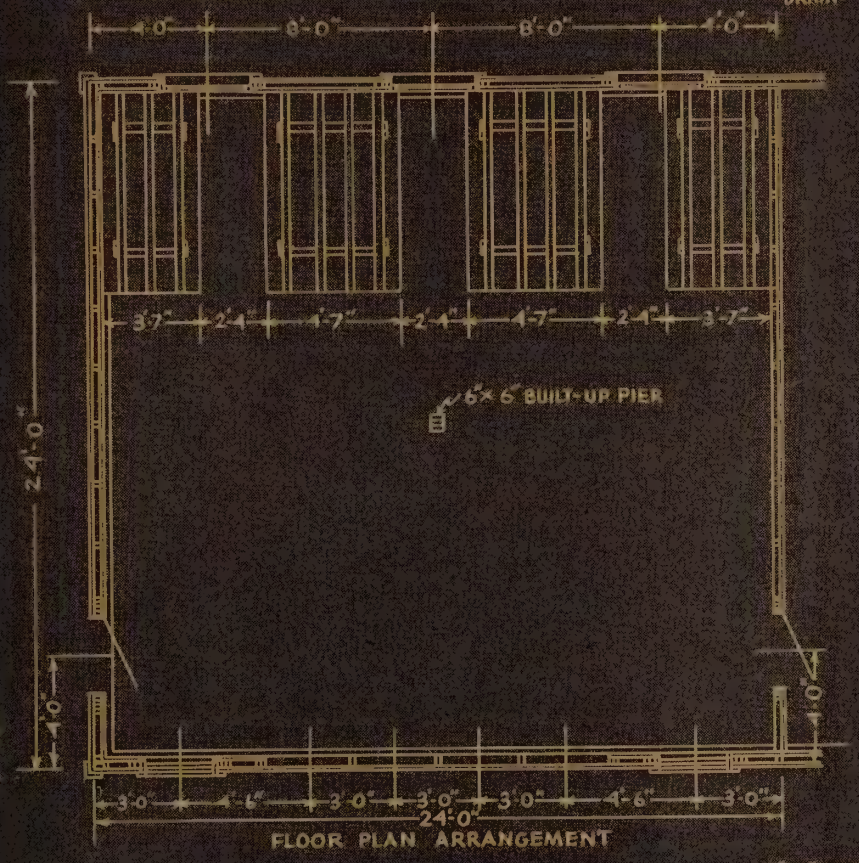
VENTILATION

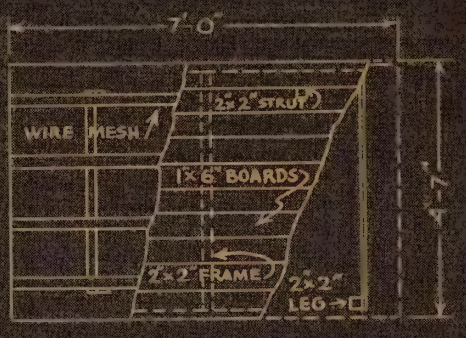
For method of regulating ventilation of this house, refer to pages 6 and 7

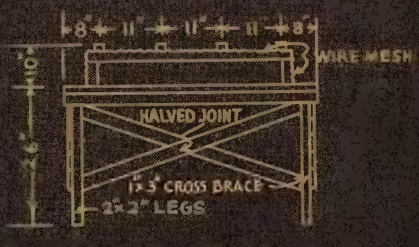
24′ × 24′ TWO-STORY LAYING HOUSE



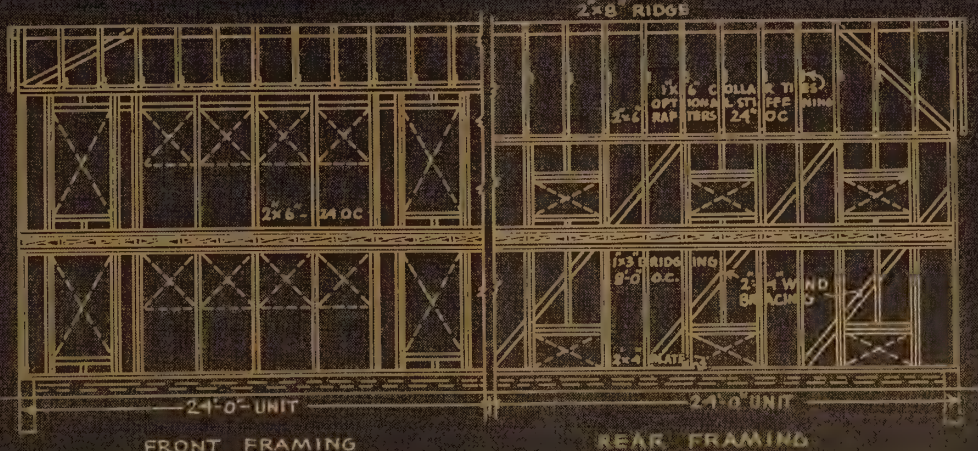








ROOST DETAILS



FRONT FRAMING

REAR FRAMING

power of the nails. Novelty siding makes a nice looking house when finished, but is not as warm as matched boards and paper unless the house is insulated.

Types of Roofs

There are several types of roofing which are equally satisfactory for poultry houses. While the initial cost of the different types of roofing varies considerably, there is comparatively little difference in the yearly cost. Among the roofing materials commonly found satisfactory for poultry house construction are prepared roll felt, either smooth, mineral-surfaced, or built up; asphalt shingles; sheet metal, either corrugated or crimped; and stamped shingles, preferably galvanized with a two-ounce or heavier coating of zinc. Wood shingles are satisfactory if the roof is designed to provide sufficient pitch.

Feed Room Requirements

Feed room requirements differ with building and construction plans and with the general management plan on the various farms. It may be either in the center of the house or at either end of the building. On sloping land, houses can frequently be planned so that feed can be unloaded on the second or third floor. On level ground this can be accomplished by the use of the unloading platform. In buildings four stories or more high, elevators are frequently used. Chutes can be used to carry feed to lower floors.

The best location for the feed room stairway is determined by other activities and arrangements. It is usually best at the rear outside corner of the pens. The door from the feed room into the first laying pen should be heavy and tightly built with strong, double-action hinges because the door must be tightly closed during cold weather.

In large houses it is very desirable to pipe water into the various pens. If the water supply is available, running water is probably the best system. A large pan with an automatic float is a popular system. There are many systems that can be used with success. The drinking fountains are usually located midway between the front and back walls. This places them near the feeders and far enough from the front openings to prevent excessive freezing.

Our results with these houses have been very encouraging. In the most adverse weather conditions, it is possible to ventilate in such a way that litter stays dry. A much higher temperature can be maintained than was thought possible with the open front house and the flock works uniformly over the floor area, even in the most severe weather.

Portable Fence

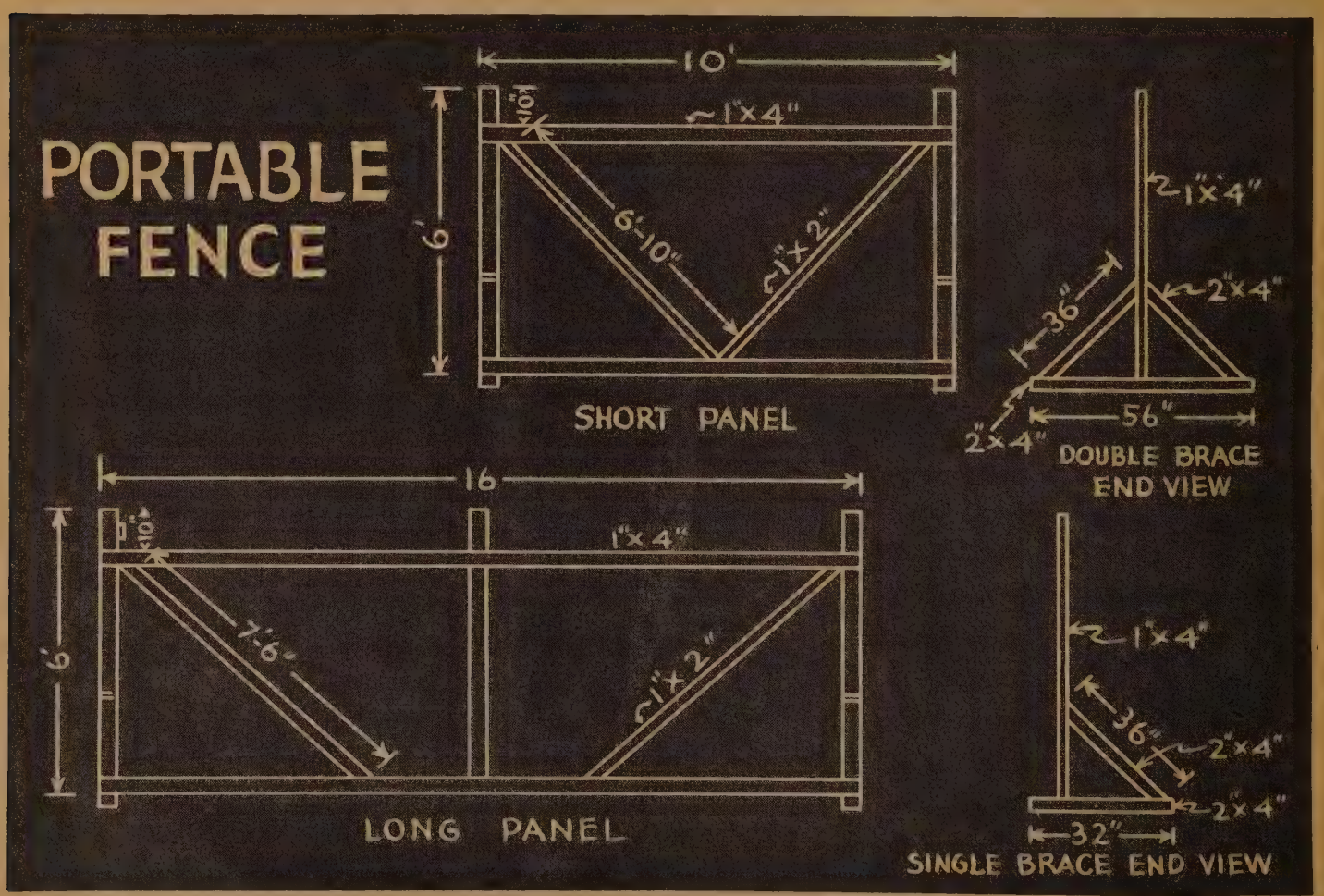
For Use Where Fences Are Moved Often

On breeding farms and other poultry plants where it may be desirable to yard the birds in relatively small groups, portable fencing may be found to be very useful. The size of the yards can be changed at will, and they can be relocated very easily. Turkey growers with small flocks might find portable fencing handy in maintaining a rotation of the ground during the early stages out on range.

The panels are made largely of 1 by 4-inch material, while the braces which help to make the panels rigid are 1 by 2-inch material. The panels should be covered with the type of poultry netting that has a small mesh at the bottom and gets wider towards the top.

Dimensions are given for both single and double braces on which the panels are fastened. It will be observed that the base of the brace uses 2 by 4-inch material, while the vertical piece is 1 by 4-inch lumber.

These plans were supplied by the Larro Research Farm.



How to Build A Summer Shelter

By C. M. Ferguson
Extension Poultryman, Ohio State University

Avoid crowding of the young stock on range by building several of these shelters.

OVER-CROWDED brooder houses and contaminated range are among the common causes of unthrifty pullets. Summer colds are often the result of crowding pullets into either permanent or colony brooder houses which are not adequately ventilated during the hot summer months.

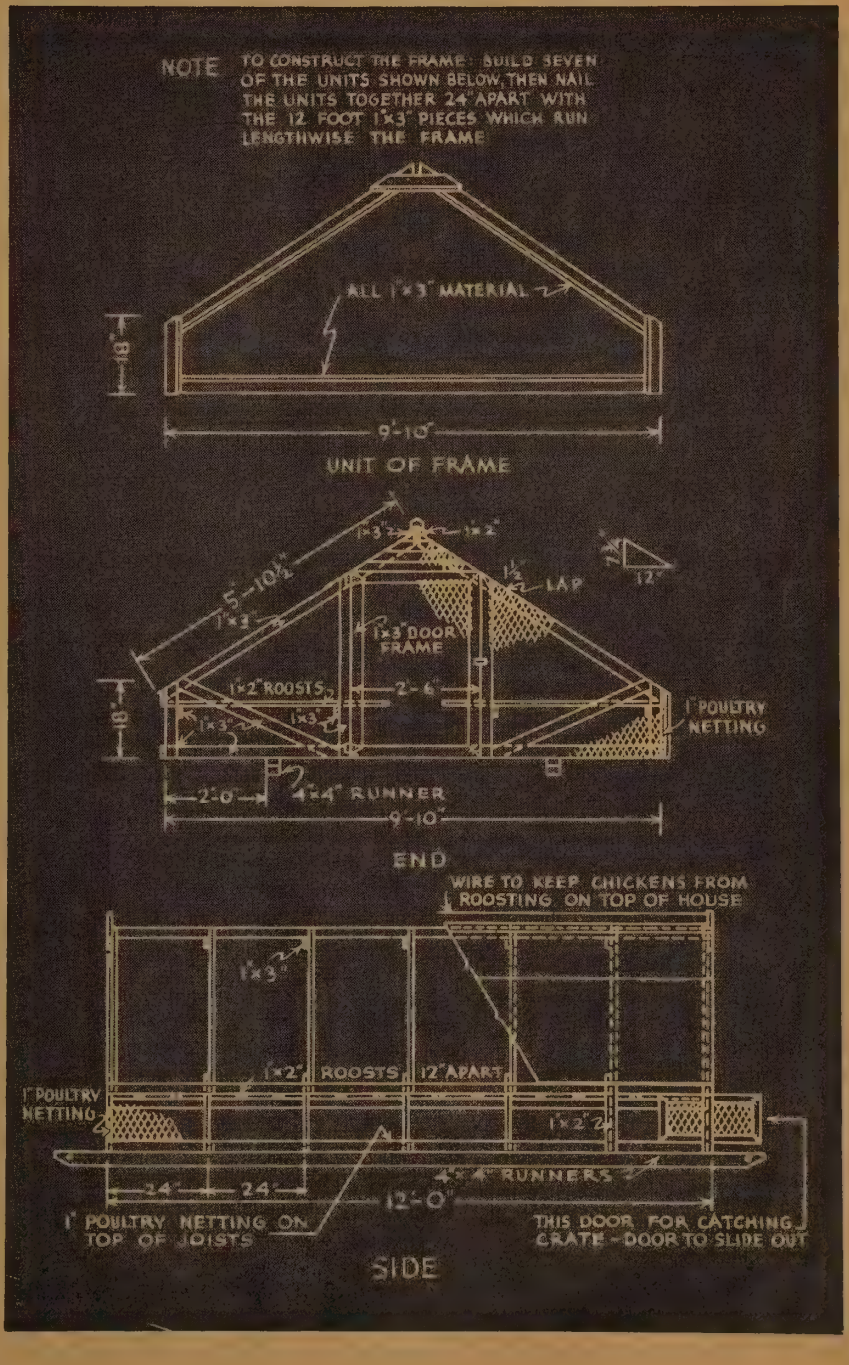
Coccidiosis and parasites are all too frequently the result of continuously ranging pullets over soil which becomes more and more contaminated as the season advances.

A Place for Extra Pullets

Inexpensive summer shelter houses have been successfully used for several years as a means of reducing these difficulties. The average 10 by 12 colony brooder house, if side or back ventilation is provided, will satisfactorily care for 100 pullets until housing time. With many poultrymen starting from 350 to 400 chicks in each house, the problem of what to do with the extra pullets becomes a serious one and too often the method resorted to is to leave them in the house and take a chance on the overcrowding, with the almost inevitable result of under developed and poorly conditioned pullets in the fall.

The unusual interest this spring in the purchase of sexed chicks will further intensify the problem of brooder house accommodations. On many farms, brooder houses which were once portable but due to old age have become too rickety to move are very frequently remodeled into permanent brooder houses with concrete floors. This plan has its merits provided some method can be used to get the chicks out as soon as they are old enough to get along without heat and after they have learned to go to roost. The shelter houses answer this problem admirably. They are light and easily moved during the growing season, which means that the pullets do not need to be confined to one area until such time as there is a tractor or team available to move the brooder house. One horse, a light truck or a car will easily move light shelter houses.

By moving the pullets out as soon as the weather permits, the ground around the permanent brooder house can be cultivated and



reseeded and be made fairly satisfactory for the next season's brooding.

Use Shelters for Old Hens Also

There is another use to which shelter houses have been put by many breeders in recent years. Old hens which are to be held over as breeders or for late fall laying after the pullets are housed are frequently without a satisfactory home during the fall months. After the pullets have been moved from the shelter houses and housed, the shelter house is often used, as one poultryman put it, for an old maid's home.

A few nest boxes can be provided and the old hens given the advantages of good range conditions under which to molt and be reconditioned before they are placed back in the breeding pens in the fall.

Shelter houses of necessity must be cheap, durable, portable, but sufficiently well constructed to keep out rodents. The plan which we are suggesting is one which was adopted several years ago at the Ohio State University poultry farm; many of them have been constructed by practical poultrymen and have been in constant use ever since.

In devising a shelter house, we attempted to design it so that construction would be simple. Our experience in building some of the original houses was that the method of framing was so complicated that an undue amount of time was required to build the shelter. This shelter is merely a frame-work consisting of a number of units, each unit consisting of two rafters, a collar-beam, two studs, and a joist. The rafters are 5 feet, 10½ inches long; the studding 18 inches high and the joists 9 feet, 10 inches long. This unit is assembled, leaving room at the top for the ridge piece.

How to Assemble Framing

These units can be quickly nailed together and then assembled as shown from the cut of the framed shelter; the shelter can be built different lengths simply by adding one or more units. After these units are built they are set up and nailed together 24 inches apart by 5 strips: one at the base on either side, one at the eave on either side, and the ridge piece. The door frame is then set in, or this can be set in to the end unit previously. An inside strip is nailed along the studding on either side just below the eave strip. Two corresponding pieces are nailed to the door frame and the two upright studs on the closed end of the shelter. These last four strips provide support for the roosts.

The roosts are not constructed to run entirely through the shelter, since it is often desirable for the attendant to walk down through the center. Two 4 by 4s placed as indicated in the picture and diagram make satisfactory skids. The floor of the shelter is covered with wire. While many poultrymen simply use inch-mesh netting, heavier, 1 by 2-inch mesh wire fabric is more durable and more satisfactory. One-inch mesh netting is all that is necessary for the side walls and ends.

Pressed Board or Corrugated Roof

The original shelter which we built we constructed with insulation board roofs, but we later found that pressed board was much more satisfactory. One poultryman in Cuyahoga County, Ohio, has substituted for pressed board, corrugated metal roofing, and I believe this change is advisable. It makes the shelter more rigid and gives a much more durable roof and, contrary to what might be expected, the house is not uncomfortably warm in the summer time due to the fact that the air circulates freely through the shelter. This poultryman laid the roof with the corrugations running the long way, rather than up and down in order to give the shelter more rigidity.

The units which we have used are either 8 or 12-foot lengths so constructed because pressed board could be purchased in those lengths. However, by using metal roofing 10-foot shelters can be conveniently constructed. The 8-foot shelter will house from 100 to 125 pullets, the 10-foot shelter from 125 to 150, and the 12-foot shelter from 150 to 175. Most poultrymen prefer the smaller shelter in either the 8 or 10-foot lengths.

Get Pullets Out Early

Shelter houses do not reach their maximum efficiency unless the pullets are gotten out into them fairly early in the season, at least as soon as the weather will permit and if they are not moved frequently during the growing season. They are designed to relieve congestion and to provide clean range and fresh pasture.

Pullets can be placed in the shelter in rather cool weather if they have been hardened off in the brooder house, but in this case, it is advisable to cover the two sides and at least one end of the shelter with either heavy building paper or feed sacks in order to break the wind. This method can also be employed if pullets are for any reason to be left in the shelters during cold weather in the fall.

This illustration shows how the framework for the shelter is assembled. The shelter can be built different lengths simply by adding one or more units.

Trailer Outfit Makes Moving of Summer Shelters Easy

The job of moving summer shelters around on the farm of George Gove, Barred Rock breeder of New Hampshire, has been made easy by the use of a two-wheel trailer outfit made with discarded auto wheels and some pieces of heavy lumber.

In the top picture, the outfit is shown hooked on to a truck. The second and third pictures show it in use. Note the blocks which hold the shelter in place. Gove's shelters are light enough that several men can lift them.

The bottom picture shows a shelter in position on a high-boarded base which is slipped under an ordinary shelter to transform it into a pen for surplus birds. By placing bags on the sides, Gove has used it successfully for holding extra breeding males over to February. This base is not used for the growing stock.

Litter Required

To cover 100 square feet of floor space at various depths, the following approximate amount of litter material (in pounds) is required:

	½ In.	1 In.	2 In.	3 In.
Peat Moss	25	50	100	150
Straw	25	50	100	150
Shavings	33	66	132	198

8x15 Turkey Shelter

By R. R. MURPHY
Pennsylvania State College

J. C. Allen Photo

TURKEY poults on range should have some protection while roosting at night. Young poults are sensitive to unfavorable climatic conditions. Considerable mortality may result from excessive exposure. Losses may also occur from suffocation if it becomes necessary for the poults to crowd in order to obtain sufficient protection. Harmful effects often result when young turkeys are exposed to severe rain storms.

The turkey shelter described in the accompanying drawing offers adequate protection for poults on range. The back of the shelter is boarded solid with either weather boarding or some other type of matched lumber. It is desirable to have a roof over the roosts used on range even though building costs are increased. Frequently, turkeys roosting in the open will leave the perches during a stormy night and crowd in ravines or along the fence rows. Furthermore, a roof alleviates stampeding at night since the flock is not so apt to be disturbed by birds and airplanes passing over them. Stampeding may result in heavy losses.

The sides of the shelter are open. This permits several of the buildings to be placed adjoining one another to form one large unit. Under some conditions it has been found desirable to have them arranged in this manner. Placing several of them together makes a suitable building for a flock of breeders during the winter and spring.

The shelter is 8 feet wide and 14 feet long and is equipped with 72 feet of perch space. It will accommodate approximately 150 poults, 8 to 14 weeks old, or 75 mature turkeys.

To facilitate moving, it is constructed out of light materials and mounted on double 2 by 10-inch skids, 16 feet long. The skids as well as the perches and floor frame should be painted with a creosote type of wood preservative. The 2 by 4-inch floor joists are mortised into the inner skids and the 2 by 4-inch studs mortised into the outer skids. This type of construction in conjunction with adequate bracing strengthens the building sufficiently for frequent moving. The upper ends of the studs are notched to receive the ends of the 2 by 6-inch roof rafter supports. Two by fours are used for roof rafters and placed 24 inches from center to center.

Roof Construction

Wood shingles, roll roofing, composition shingles or galvanized iron may be used as roofing material. For wood shingles or galvanized iron, 1 by 2-inch slats should be nailed across the roof rafters approximately 5 inches from center to center. A 5-inch exposure for wood shingles on a building of this type is entirely satisfactory. Shingles should be kept painted with a satisfactory wood preservative.

If galvanized iron is used, it should be kept painted with a good grade of either an iron oxide or aluminum paint in order to prevent rusting of the metal. A few cents spent for paint or a preservative often saves many dollars of repairs.

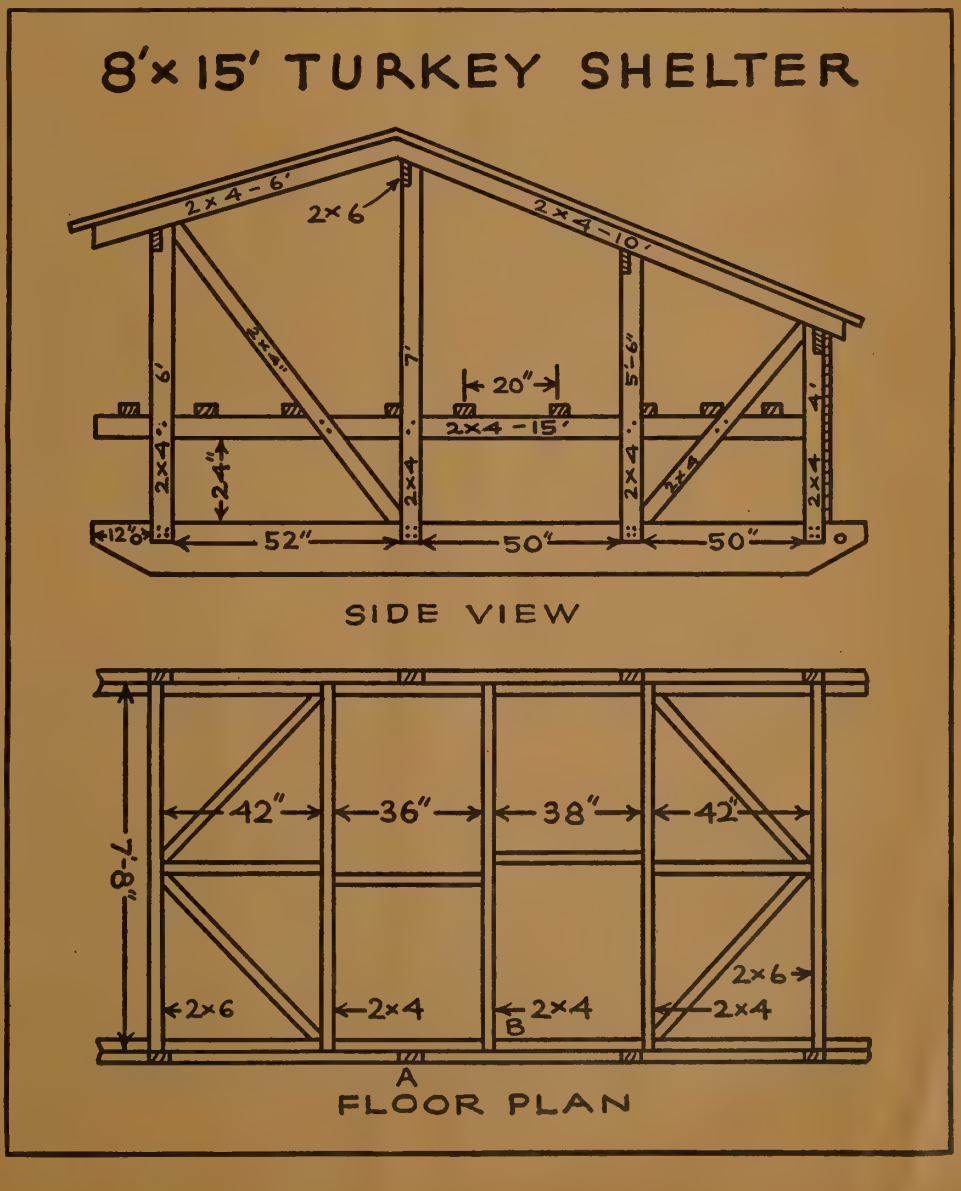
For roll roofing or composition shingles, the roof should be sheathed with either 1-inch boards or matched roofers. If boards are used they should be of narrow widths so as to reduce expansion and contraction, thus avoiding wrinkling and tearing of the roofing paper after it has been applied.

Shelters with wire floors keep the turkeys out of the droppings and aid in maintaining cleaner conditions on range. The wire for the floor should be at least a 1½-inch mesh, 16 gauge or heavier hexagonal poultry netting. A 1 by 4-inch mesh, 14 gauge or heavier welded wire fabric also makes a satisfactory floor for turkey shelters. Wires of a lighter gauge will not last and must be replaced from time to time as it rusts through.

Shelters Should be Moved

Turkey shelters should be moved either short distances every few days or greater distances less frequently. Moving the shelters frequently encourages the turkeys to pasture the range more uniformly and the droppings do not accumulate in a thick layer at one place. The area where shelters have been for some time should be cleaned of droppings and well limed immediately after the buildings are moved.

Some growers have experienced difficulty in getting young turkeys to use the shelters when first moved to range. To train them, about 15 poults can be placed in each shelter the first day. These can be taught, with little difficulty, to roost in the shelters that night. After the first night, these birds will go to roost of their own accord. As other poults are added to the flock, they will follow to the roosts those which have been trained.



Plans for 2 in 1 Brooder House

Glass substitute frames which tip inward are removed in the summer.

Harold Bell and Son "raised the roof" on a shelter to make this combination brooder house and summer range shelter

HAROLD BELL wasn't satisfied with conventional brooder houses and range shelters, having found that most range shelters can't be used for small chicks, and that brooder houses are too hot in summer. The accompanying illustrations show what was worked out by Mr. Bell and his son—who forms the other half of the Harold Bell & Son team at Bell Poultry Farm, Greene County, Pennsylvania.

They wanted a range shelter that could be used for small chicks, but which would be cool in summer. The house had to have a floor, so must be built so storms would not blow rain in when it was opened up in summer. It had to be light so that two good horses could move it about, yet had to be strong enough to stand the strain of moving.

Asking too much of one building? Harold Bell doesn't think so. In effect, he says, they took a shelter, raised the sides and roof, and boarded the sides up part way. The house now has all the qualities they desired—and it isn't expensive to construct. Joists are 2 by 4s, 10 feet long; studs are 2 by 3s, except in front, where 2 by 4s are used in the doorway and 2 by 2s between the windows on each side of the door. With the sides opened, the house is not too hot.

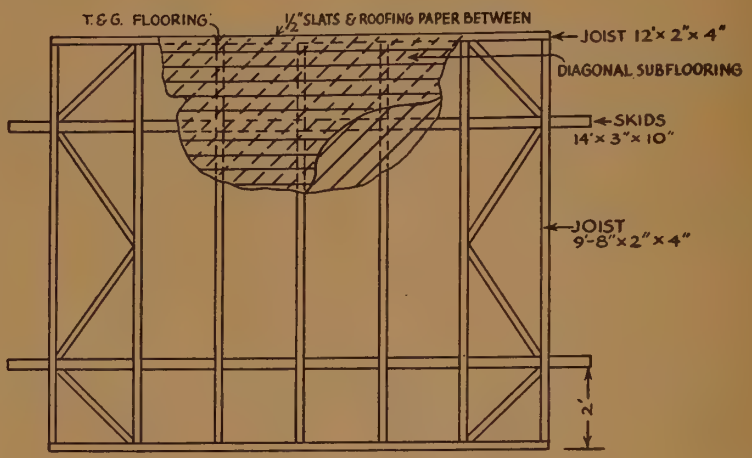
In constructing the house, Bell lays roofing paper over the floor sheathing, nails 1 by 2-inch strips over the 2 by 4 joists, and lays 1 by 6 flooring over the strips, leaving an air space. The doors can be removed in summer for ventilation. The house pictured has tee hinges, filed off on one end. Spikes are used for pins.

The windows (made of a glass substitute) are arranged so they can be opened at the top and removed entirely in warm weather. Bell uses 1 by 4-inch boards on the 2 by 2s and door jams in such a manner that they will extend over the sides, holding the window frames in. The base of the windows in front is 1¾ by 2¾-inch material.

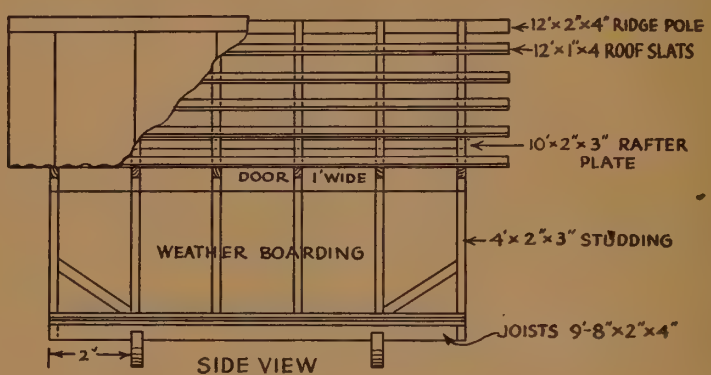
If sheet metal cannot be obtained for the roof, Mr. Bell recommends one-half inch shiplap, covering it with an asphalt combination roofing. One inch sheathing would make it more substantial, but by placing a 1 by 2-inch strip between the rafters so that the roofing nails would be driven into it, the one-half material will be heavy enough and there'll be no danger of getting the scalp torn by roofing nails in the ceiling.

A view of the rear of the brooder house —shelter, showing the open ventilator.

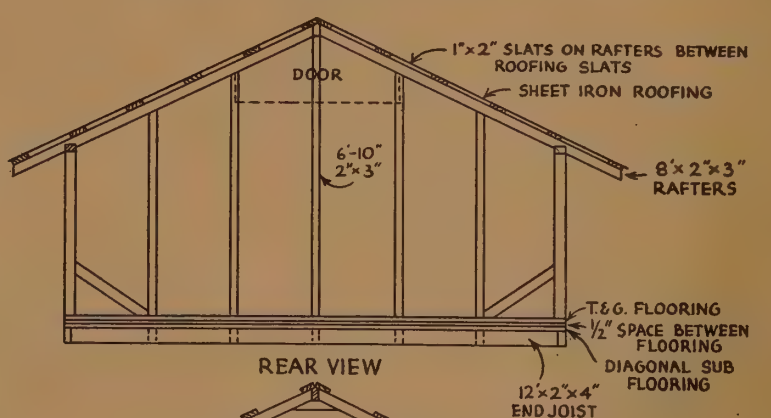
10×12 COMBINATION BROODER HOUSE AND SHELTER



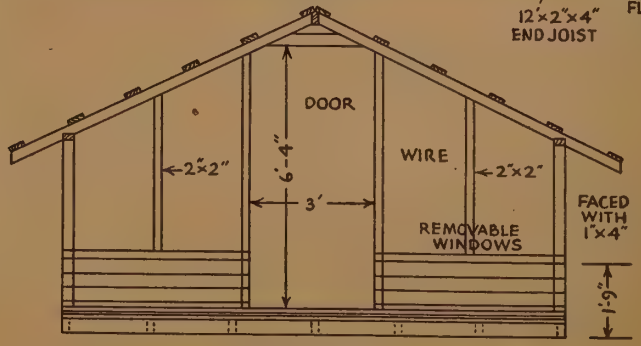
FLOOR PLAN



SIDE VIEW



REAR VIEW



FRONT VIEW

Plans for 10 by 10 *Range Shelter*

It's Sturdy, Provides Good Ventilation, and the Cost is Low

By ROLAND C. HARTMAN

IF you ask Melvin Moul of Brentwood Poultry Farm of New Hampshire why he prefers the high type of range shelter which he uses on his breeding farm, he'll give you a number of distinct reasons.

First, the high sides — they are 4 feet from sill to plate — permit free circulation of air. There is no danger of suffocation in extremely hot weather, a condition that sometimes occurs in low-roofed shelters.

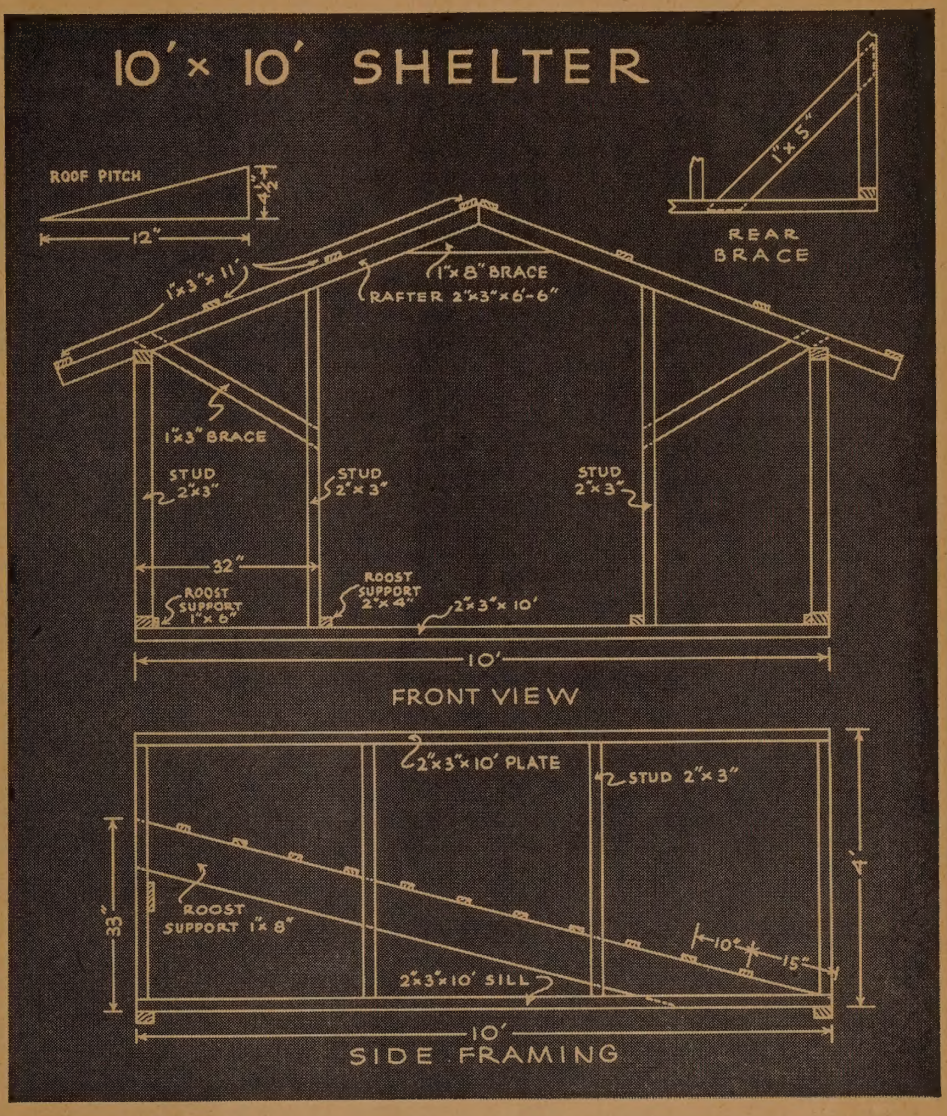
Second, the sloping roosts prevent crowding and piling, for the birds tend to work up to the highest roost instead of blocking the front one.

Another advantage of this shelter, Moul points out, is the fact that its height makes it easy to catch birds for vaccination and housing, jobs which he does at night. There is no crawling on hands and knees.

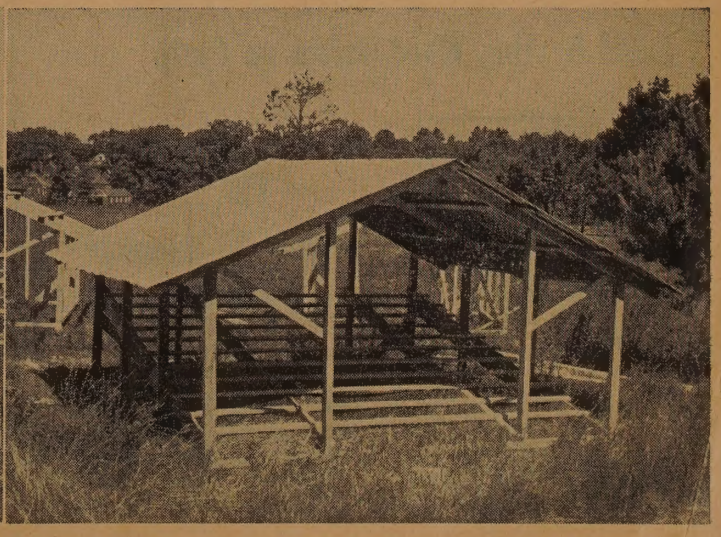
The shelter measures 10 by 10 feet. Although reasonably light in construction, it is strong enough that it withstands twisting when it is being moved. The group of shelters built by Moul in 1941 cost about $18 each, including labor, but it is likely that costs now would be somewhat higher.

By referring to the drawings, it will be observed that 2 by 3-inch material is used for the sills, studs, plates, and rafters. The side roost supports can be of 1 by 6 or 1 by 8-inch material. The two middle supports are 2 by 4's. Wire netting to keep the birds out of the droppings is applied to the supports before putting down the roosts.

Moul prefers metal roofing, using the v-crimp type. Sheet metal roofing reflects heat, adds to the structural strength without increasing the weight of the shelter, and it is durable. Since metal roofing may not be available in many localities, it may be necessary to use other types of roofing.



Poultry netting is applied to the sides and back of the shelter before putting on the roofing.



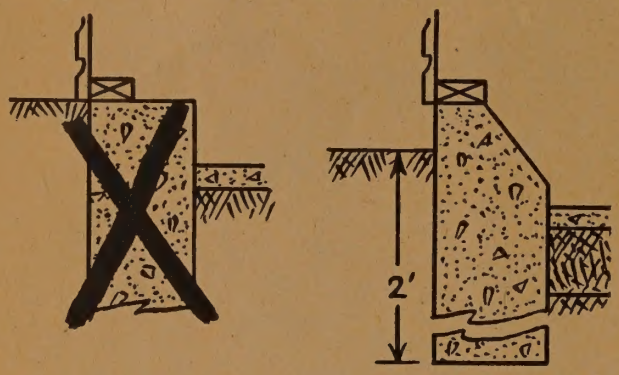
Here is the completed shelter. It is well ventilated, and one can work inside very comfortably.

POULTRY HOUSE *Foundations*

Your Poultry Houses Will Have Longer Life If You Avoid These Common Errors in the Construction of Foundations

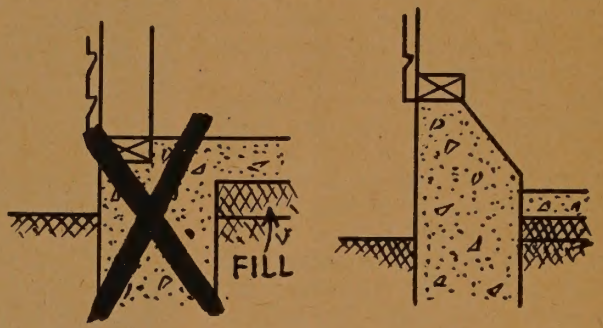
By W. C. KRUEGER

Keep Sills Above Ground Level



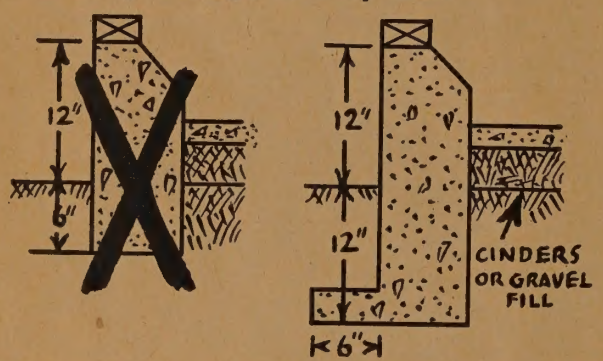
Sills and siding rot when earth is banked up against building. Common mistake when house is built on a slope. Correct method at right.

Don't Embed Sills Flush in Floor



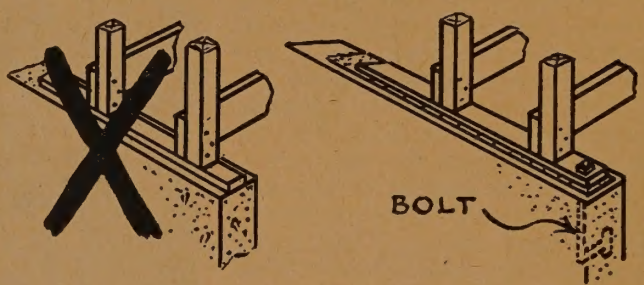
When sill is embedded in concrete floor (left), it may rot in time, throwing the upper part of house out of line and leaving it insecurely fastened. Correct relationship shown at right.

Sink Deep Enough to Stop Rats



Rats may dig under shallow foundations. Sink the walls deep enough or extend an apron out 6 inches from the wall to discourage the rats.

Seal Sill to Foundation Wall

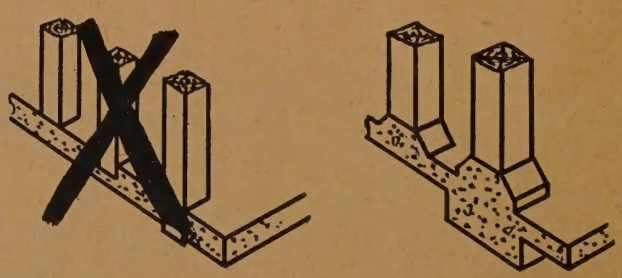


There should be a soft mortar bed between the sill and foundation wall to make an air tight joint and provide a continuous bearing (right). For stability, sills should be bolted to the foundation at intervals of about 6 feet apart.

Avoid Resting Wood Joists on Earth

Rotting of wood joists will occur if the wall is poured flush with ground (left) and joists are permitted to rest upon the earth. Proper construction is shown at right, wall above ground level and joists raised above earth.

Provide Sure Footing for Posts



Posts resting directly on the floor, partly imbedded in the concrete, or extending through to the earth may rot out. Two better ways (right) show posts on concrete above level of damp litter, one with extra footing for added strength.

Cost Estimate Sheets

If you are interested in knowing the cost of materials in your own locality for one of the buildings for which plans are given in this book, you will find it convenient to use the cost estimate sheets which are available on most of the plans. It is simply a bill of material arranged in such a manner that your local lumber dealer or supply man can fill in the cost of each item required for construction.

Cost estimate sheets can be supplied at 6 cents each. Orders should be addressed to the Service Bureau, Everybodys Poultry Magazine, Hanover, Pennsylvania. Cost estimate sheets are available on the following plans:

22 by 22 Insulated Laying House—Leader Type

10 by 12 Insulated Brooder House

Connecticut 24 by 24 Two-Story House

New Jersey 20 by 20 Shed-Roof Laying House

10 by 16 Brooder House (Leader Type)

Massachusetts 24 by 24 Two-Story Laying House

20 by 20 Turkey Shelter

Penn State 8 by 15 Turkey Shelter

Conn. 6 by 10 Cold Weather Shelter

Penn State 20 by 40 Laying House